

*Yrjö Jahnsson was Professor of Economics at the Helsinki University of Technology between 1911 and 1936. In 1954, his wife Hilma Jahnsson established, in accordance with her late husband's wishes, the Yrjö Jahnsson Foundation. The purpose of the Foundation is to promote Finnish research in economics and medical science, and to support Finnish institutions of research and education.*

*In the field of economics the Foundation is the most important source of private research funding in Finland. It supports the work of individual scholars and institutes by awarding them scholarships and grants. It organizes scientific seminars and workshops in the field of economics and medicine. And it invites internationally renowned economists to Finland to give lectures.*

*In 1963 the Foundation launched a special series of the Yrjö Jahnsson Lectures, which are organized in Helsinki every two or three years and which are published. Up to the end of 1996 no fewer than five of the economists who have served as lecturers in this series have been awarded the Nobel Prize in economics.*

---

THE YRJÖ JAHNSSON LECTURES

Kenneth J. Arrow  
*Aspects of the Theory of Risk-Bearing*

Assar Lindbeck  
*Monetary-Fiscal Analysis and General Equilibrium*

L. R. Klein  
*An Essay on the Theory of Economic Prediction*

Harry G. Johnson  
*The Two-Sector Model of General Equilibrium*

John Hicks  
*The Crisis in Keynesian Economics*

Edmond Malinvaud  
*The Theory of Unemployment Reconsidered*

James Tobin  
*Asset Accumulation and Economic Activity*

János Kornai  
*Growth, Shortage and Efficiency*

Jacques H. Drèze  
*Labour Management, Contracts and Capital Markets*

Robert E. Lucas  
*Models of Business Cycles*

Amartya Sen  
*Rational Behaviour*

A. B. Atkinson  
*Poverty in Europe*

Hans-Werner Sinn  
*The New Systems Competition*

YRJÖ JAHNSSON LECTURES

# The New Systems Competition

Hans-Werner Sinn

IFO-INSTITUT

05. März 2003

Bibliothek

ifo Institut Bibliothek



158a\$0160709

 **Blackwell  
Publishing**

© 2003 by Yrjö Jahnsson Foundation and Hans-Werner Sinn

350 Main Street, Malden, MA 02148-5018, USA  
108 Cowley Road, Oxford OX4 1JF, UK  
550 Swanston Street, Carlton South, Melbourne, Victoria 3053, Australia  
Kurfürstendamm 57, 10707 Berlin, Germany

The right of Hans-Werner Sinn to be identified as the Author of  
this Work has been asserted in accordance with the UK Copyright,  
Designs and Patents Act 1988.

All rights reserved. No part of this publication may be reproduced,  
stored in a retrieval system, or transmitted, in any form or by any  
means, electronic, mechanical, photocopying, recording or otherwise,  
except as permitted by the UK Copyright, Designs and Patents  
Act 1988, without the prior permission of the publisher.

First published 2003 by Blackwell Publishing Ltd

*Library of Congress Cataloging-in-Publication Data*

Sinn, Hans-Werner

The new systems competition / Hans-Werner Sinn.

p. cm. — (Yrjö Jahnsson lectures)

Includes bibliographical references and index.

ISBN 0-631-21951-X (hardback : alk. paper) — ISBN 0-631-21952-8  
(pbk. : alk. paper)

1. Competition, International. 2. Competition.  
3. Government competition. I. Title. II. Series.

HF1414 .S564 2003  
338.6'048—dc21

2002005621

A catalogue record for this title is available from the British Library.

Set in Galliard 10/12.5pt  
by Graphicraft Limited, Hong Kong  
Printed and bound in the United Kingdom  
by MPG Books Ltd, Bodmin, Cornwall

For further information on  
Blackwell Publishing, visit our website:  
<http://www.blackwellpublishing.com>

## Contents

<i>List of Table and Figures</i>	ix
<i>Preface</i>	xi
<b>1 Competition Among States</b>	<b>1</b>
The New Systems Competition	1
The Selection Principle	5
Inefficient Governments and Systems Competition	8
Systems Economics and the Hierarchy of Competitive Processes	10
Systems Competition: A Construction Principle for Europe?	14
The Euro and the Integration of Capital Markets	16
Migration in Europe	21
<i>Quo Vadis</i> Europe?	25
<b>2 Taxes and Public Infrastructure Goods</b>	<b>27</b>
Competition between Fiscal Systems	27
The Standard Argument	28
Competition with Infrastructure Goods	30
Fiscal Competition and Impure Public Goods	32
The Social Optimum	36
Who Pays for the Infrastructure?	38

The Selection Principle, the Theory of Clubs and the Race Below the Bottom	39
Tax Harmonization and the Overprovision of Public Goods	43
Self-Financing Constraints and Average Cost Pricing	45
A Critique of the Underprovision Hypothesis	49
Residence Taxes	51
Dividend Taxes and Equity Traps	53
Existence Problems	56
Policy Implications	60
<i>Appendix to Chapter 2</i> Criticism of the Zodrow and Mieszkowski Infrastructure Model	61
<b>3 The Erosion of the Welfare State</b>	<b>64</b>
Globalization and the Welfare State	64
Income Redistribution and the Selection Principle: An Insurance Theoretic Interpretation	66
Redistribution as an Allocative State Responsibility: A Simple Model	70
The End of the Welfare State in Tax Competition	74
The Home Country Principle	78
<i>Appendix to Chapter 3</i> The Non-Existence of a Market for Wage Insurance	81
<b>4 Social Dumping in the Transformation Process?</b>	<b>86</b>
The Accusation of Social Dumping	86
Redistribution vs. Wages in Kind	88
Why are the Differences in Direct and Indirect Wage Costs so High?	89
A Simple Model of the Economic Catching-Up Process	93
The Policy of the National Government	97
The Overall Welfare Optimum	99
The Properties of the Catching-Up Process	102
Lessons from German Unification	108
Why Low Wages and Social Standards Do Not Indicate Social Dumping	110
<b>5 Ecological Competition</b>	<b>112</b>
Ecological Dumping or Excessively Green Policies?	112

Conditions for a Functioning Ecological Competition	113
Ecological Dumping with International Spillover Effects	117
Pollution Certificates, Foreign Direct Investment and the Rent Dissipation Effect	121
Environmental Standards	127
The Environmental Policy Externalities: A Suggested Interpretation	130
Policy Implications	133
<b>6 The Competition of Product Standards</b>	<b>135</b>
Cassis de Dijon and Deregulation Competition	135
The Lemons Problem	136
Simple Model of Private Quality Competition	139
An Allocative Explanation of the State Regulation of Quality	141
The Competition of Laxity	144
Policy Implications	147
<i>Appendix to Chapter 6</i> The Properties of the EE Curve in Figure 6.1	148
<b>7 Limited Liability, Risk-Taking and the Competition of Bank Regulators</b>	<b>150</b>
Banking Risks	150
Lemon Bonds	152
A Note on the Literature on Limited Liability and Risk-Taking	155
Banking with Unlimited Liability: The Basic Model	157
Lemon Banking and the BLOOS Rule	159
Welfare Implications and Optimal Regulation	165
The Competition of Banking Regulation	168
The Basel Committee and EU on the Right Track	174
<b>8 The Competition of Competition Rules</b>	<b>178</b>
A Tottering Creed	178
Regulating the Monopoly	180
The Advantage of Forming a Common Market	185
The Ordo Liberal Equilibrium in Systems Competition	186
Ordo Liberal Policy vs. First-Mover Advantages	188

The Deregulation Race	194
An Uncomfortable Proposition	203
Reconsideration of Regulation Policy	205
<i>Epilogue</i>	207
<i>References</i>	208
Chapter 1	208
Chapter 2	210
Chapter 3	212
Chapter 4	214
Chapter 5	214
Chapter 6	215
Chapter 7	215
Chapter 8	217
<i>Index of Names</i>	218
<i>Subject Index</i>	221

## Table and Figures

### TABLE

1.1 Systems economics compared with other economics disciplines.	12
--	----

### FIGURES

1.1 Convergence in the European capital markets: long-term interest rates in Euroland.	17
1.2 Average tax burden on subsidiaries of US corporations in Europe after 1986 US tax reform.	19
1.3 The increasing share of labour taxes in the OECD countries.	21
1.4 Migration in Europe 1992.	23
2.1 The erosion of source taxes in tax competition.	29
2.2 The optimal compensatory tax rate.	35
3.1 Violation of the Selection Principle?	69
A3.1 The non-existence of an insurance equilibrium.	82
4.1 Labour cost in manufacturing in European countries 1999 (euros per working hour).	90
4.2 Factor price equalization between the joining region and the core region.	104
4.3 Investment and capital in the adjustment process.	105
4.4 The adjustment of the labour market.	106

5.1	The optimal Pigovian tax rate.	116
6.1	The lemons problem and deregulation competition.	143
7.1	Share of liabilities to non-residents in 1996.	155
7.2	Kinked utility and the BLOOS rule.	160
7.3	The bank's optimal risk choice under the BLOOS rule.	164
8.1	The ordo liberal creed.	184

## Preface

This book contains the material of the Yrjö Jahnsson Lectures which I presented in January 1999 in Helsinki. I am very grateful for the honour of having been invited to contribute to this famous series whose published results have not only had a significant impact on the course of economic thought but have also influenced my personal development as an economist ever since my student days in Münster and Mannheim. That I would be asked to deliver these lectures one day would never have crossed my mind. I am grateful to the foundation and the Finnish colleagues for the hospitality they offered to me and my wife during the lectures.

The lectures are about systems competition in the sense of competing for mobile factors of production rather than the traditional yardstick competition. While a substantial body of literature has developed on the problem of tax competition, my interest centres on a broader set of competitive instruments, including government expenditure, environmental regulation, labour standards, quality standards and even competition rules. There is such a thing as the competition of competition rules, for example.

One topic which I had wanted to include in the lectures but failed to handle satisfactorily at the time was the competition of banking regulation. In the light of the Asian banking crisis, I found this topic sufficiently important not to submit the manuscript before I had managed to add a chapter. However, due to my new obligations as president of the Ifo Institute, I did not succeed in doing so until the summer

vacation of 2001. Writing the chapter was fun, and I do not regret having waited.

I have been interested in systems competition ever since my inaugural lecture as honorary professor at the University of Vienna in 1988, because I doubted the frequent claims of my fellow economists from the German Scientific Council of the Ministry of Economics that systems competition could be a construction principle for the European Community. Since then, I have published a number of policy and theory articles on various facets of the topic, including, for example, a report for the German Monopoly Commission. I have conducted graduate courses on systems competition at the University of Munich and in the Dutch doctoral programme at the University of Groningen. I also presented a number of seminars on related topics at various European universities, and I circulated earlier versions of the manuscript among my colleagues and students. This is the time to thank all those who participated in the lively discussions of my often controversial propositions and who gave many useful comments, suggestions and counter arguments which have helped me sharpen the argument. In particular, I am grateful for the comments I received from the very knowledgeable and lively audience that attended the Yrjö Jahnsson lectures.

I can only single out a few people who assisted in this publication. I received useful comments on the banking chapter from Vesa Kanninen, on the chapter on competition laws from Klaus Schmidt, and on various other aspects of the book from Ronnie Schöb, Marcel Thum and Alfons Weichenrieder. Technical assistance as well as useful comments on the content I also obtained from Regina von Hehl, Juli Irving-Lessman, Marko Köthenbürger, Robert Koll, Paul Kremmel, Claudio Thum and Frank Westermann. This is the first of my books for which I am indebted to my IBM laptop rather than my secretaries for an excellent typing job, though now the blame for the remaining errors rests firmly on my shoulders.

*Gauting, January 2002*  
Hans-Werner Sinn

# 1

## Competition Among States

### THE NEW SYSTEMS COMPETITION<sup>1</sup>

In a broad sense, the competition between systems has ended. The enormous economic power of the capitalist market economy forced communism to its knees: the discredited central planning system has left the stage of world history.

In a more narrow sense, the competition between systems is just beginning. Not all market economies are the same. Today many different varieties can be found all over the globe: market economies with planning elements as in France, quasi-night watchmen systems as in the USA, liberal corporate systems as in Japan, competitive socialist systems as in China, and social market economies as in Germany and the Scandinavian countries. Only time will tell which of these different systems will survive and how the remaining systems will evolve.

The old systems competition between communism and capitalism was aimed at gaining economic, cultural and, most importantly, military dominance, and took the form of mutual observation, imitation and innovation while the borders were closed. In the new systems competition, the goal of military dominance has lost importance, and a new element has been added to the competitive process that fundamentally changes its nature. This element is the international migration of people and capital as a reaction to national policy decisions. The migration response of production factors makes states behave like firms which

<sup>1</sup> A variant of this section has appeared as Sinn (2001).

compete for customers by offering them attractive combinations of tax prices and public goods. In the old systems competition, relocation decisions were excluded by the Iron Curtain and other means of tightening the national borders. In the new systems competition, location decisions will be the central driving force for national policy reforms. The factors of production are complements and cannot operate without one another. Whoever controls the political process in a country will have to make sure that not only the factors he owns are treated well by the state but also those factors that are mobile internationally and whose escape would have adverse repercussions for the domestic economy as a whole.

The difference between the old and the new systems competition can be clarified by alluding to Albert Hirschman's (1970) theory of institutions which emerged from his personal experience as a socialist youth leader who managed to escape the Nazi regime. Hirschman argued that people have three options to cope with unattractive institutions or states: 'exit, voice and loyalty'. Voice and loyalty were the forces that were characteristic in the old competitive process. Exit is the special feature added in the new form of systems competition. If exit had been easier at the time when Hirschman fled, many more people would have left Germany, and history might have taken a different course.

Today, there is a widespread fear in social welfare states that private companies will use the exit option. While goods and financial capital have been moving freely across borders for some time, real capital is now following. More and more firms are transferring their operations to countries with low wages and taxes to hold their own in the increasingly intensive international product and cost competition. The more liberal the trade relations and the lower the relative transportation costs, the easier the relocation becomes, for it is no longer necessary to choose a production site in the neighbourhood of marketplaces. Cross-border mergers contribute to reducing the cost of relocation decisions. Once a multinational company is established, it can easily shift capital and tax bases between the countries where it operates. The New Economy, too, will facilitate relocation decisions. Virtual firms that employ people in different parts of the world and connect them via the Internet can be moved to low-tax countries without moving matter and without incurring any particular relocation cost. The Organization for Economic Cooperation and Development published an extensive policy report under the title *Harmful Tax Competition. An Emerging Global Issue*

(OECD, 1998) in which they spelled out a large number of legal and economic problems resulting from the increased mobility of international capital. The issue has, indeed, become more pressing in recent years and needs both analysis and policy actions.

By comparison, labour markets are far from perfect, since many people are reluctant to cross cultural borders and ignorant about living conditions in other countries. However, things are changing even here. More and more people from all income categories are starting to move, looking for better living conditions elsewhere in the world. There is a host of top managers who are willing to work abroad or are expected to do so by the multinational corporations that employ them, guest worker flows are normal phenomena in the European Union and elsewhere in the world, and many retired people decide to spend their pensions in low-cost countries. In terms of languages spoken, some Mediterranean islands are undergoing changes in their national identities, and construction sites in northern Europe have become veritable Towers of Babel.

One special aspect of globalization is the migration of poor people from the less developed economies to the more developed ones. The time when lack of knowledge and transport costs hindered such migration is long since past. Global television coverage and increasing hordes of tourists are spreading the news about the prosperity of the Western industrial countries even to the most distant Himalayan villages, and the prices that the illegal transport organizations charge for transferring people from the Third World to the First World are falling fast because controls have weakened and air traffic has become cheaper. Ships full of Kurdish refugees land on Italian coasts, planes with Tamil asylum seekers land at German airports, and desperate refugees from the former Soviet Union risk their lives by swimming across the Oder at night to enter Germany undetected.

As will be explained below, the migration flows will probably increase multifold when eastern Europe joins the EU for then the right of residence will be granted to those who wish to work abroad. Extensive migration can be expected in Europe as the pressure built up over decades of communist dictatorship is suddenly released.

The increasing mobility of people, goods and factors of production will put the countries of the world under severe competitive pressure. Competition is no longer over advancing a largely self-sufficient economy to a position of economic strength, social peace or military superiority by means of clever internal policy measures. The strategies of Bismarck,

Stalin or Reagan are no longer in demand. The leaders of every country must now consider what influence their national institutions can exercise on the cross-border transfer of economic activities. Taxes, expenditures, social transfers, public goods, regulation systems, legal systems and many other things affect the location decisions of people and production factors just as much as do wages and other economic factors which are not directly influenced by the government. No government can permit mobile capital to be driven away because of the unusual design of its institutions any more than it can permit its institutions to attract the world's poor. Like a private firm, a government competes for good customers and must try to ward off the bad ones.

In the late 1960s the city of New York implemented a very generous social assistance programme to help its poor and check the negative social implications of poverty. It soon became clear that the programme could not be maintained since it attracted the poor from all over the United States and imposed a huge burden on the municipal budget. The programme had to be limited to prevent the city from going bankrupt.<sup>2</sup> The city government had to learn the hard way that it could not act against the forces of systems competition.

The effects of systems competition are not always so readily evident, however. Often the migration responses are so slow that a long period of time can elapse before a country is forced to react to a policy move of another country. In 1982 the Wassenaar agreement on wage moderation was made in the Netherlands, and in 1986 the United States enacted its policy of tax cut cum base broadening. It took Germany more than 15 years and a number of spectacular relocation decisions to understand what had happened and to consider copying these reforms. In the light of these observations, the reader should be warned

<sup>2</sup> In John Lindsay's first term as Mayor of New York City (after 1965), social welfare spending grew from 12.5% to 23% of total city expenditures (Glaeser and Kahn, 1999, p. 124). The increased spending went primarily to low-income groups, mostly black and Puerto Ricans; eligibility was lowered and benefits were increased (Shefter, 1985, p. 86). The city became very attractive for this segment of the population, which immigrated to New York from all over the United States.

Since the tax base eroded (also as a result of the economic downturn between 1973 and 1975), and since insufficient effort was made to get permission from the state and federal levels to raise taxes, the city's debt increased rapidly, and in 1975 the banks refused to include city securities in their portfolios. As a result, the city had to implement drastic spending cuts to regain its credit standing.

not to interpret the theoretical results of this book from the angle of day-to-day politics. It may take many decades before the forces analysed here become visible.

The long time span is a potential problem from an international policy perspective, for if there is something wrong with systems competition, if it does not work in the same way as private markets do, then it will be difficult to implement timely corrective measures such as mutual international agreements on political conduct or the development of international political structures and institutions. The sluggish reactions of national policies could make a trial and error process in the development of international institutions extremely costly. When unpleasant implications of systems competition become visible, it may be too late for countervailing policy measures. Therefore, theoretical studies are indispensable. They give an early warning of some problems, alert politicians and help them take precautionary actions.

## THE SELECTION PRINCIPLE

Many economists place much faith and hope in the forces set in motion by systems competition. They praise this type of competition as a disciplinary device that will shape a better Europe. Some of them, mostly in the tradition of Hayek and Schumpeter, argue that competition per se is a good thing because it is an 'exploration and invention device' and brings about 'creative destruction'. Others refer to Adam Smith's Invisible Hand and the Main Theorem of Welfare Economics that establishes the Pareto efficiency of competitive equilibria under certain conditions. Still others simply overlook the potential fallacy of aggregation, confusing national with international optimization constraints.

It is undoubtedly true that the word 'competition' rings positively in the economist's ear. However, this does not decide the matter, since the rules of the game under which systems competition takes place are very different from those under which a market economy functions. Where are the well-defined property rights and where is the price vector that makes the plans of different agents compatible and clears the markets? There may be analogies, but to work them out is anything but a trivial exercise. Even market economies will not, in general, be Pareto efficient when there are increasing returns to scale, external effects, information asymmetries or other violations of the assumptions

underlying the Main Theorem of Welfare Economics. How can it be taken as self-evident that systems competition would not suffer from such problems? Approaching the problem of systems competition with semantic intellectual exercises leads nowhere. Migration competition has its own adaptive mechanisms which need specific analysis.

Models of systems competition with assumptions tuned to efficient competition between states can now be found in the literature. These models go far beyond the semantic exercises of the Hayekian economists, because they define the exact conditions under which the Invisible Hand would work in systems competition.<sup>3</sup> This is without doubt an intellectually attractive venture, but whether the models really depict the essentials of systems competition is debatable.

The reason for the doubts is to be found in what I have called the *Selection Principle*.<sup>4</sup> The Selection Principle says that governments have taken over all those activities which the private market has proved to be unable to carry out. Because the state is a stopgap which fills the empty market niches and corrects the failures of existing markets, it cannot be expected that the reintroduction of the market by the back door of systems competition will lead to a reasonable allocation result. Instead, it must be feared that the failures that originally caused the government to take action will show up again at the higher level of government competition.

There are a number of examples of the kind of fears that the Selection Principle gives rise to, and this book studies some of them. If the state has taken over the production of goods with increasing returns to scale because private markets tend to result in ruinous competition, must not ruinous competition between states be feared? If the state has stepped in as an insurer where private insurance markets have not been established because of adverse selection processes, will there not be an adverse selection between insurer states, too? If the state regulates the product quality of private firms or makes regulations about bank solvency because it wants to prevent lemon markets from appearing, will there not be a lemon market between the states in which the states neglect their regulatory responsibilities? And finally, if the state

<sup>3</sup> Optimistic views of fiscal competition are held, e.g., by Richter (1994, pp. 223–430), Wellisch (1995) or Oates and Schwab (1988, pp. 333–54). For a thorough overview and useful extensions of the existing literature see Wellisch (1999).

<sup>4</sup> See Sinn (1997a, 1997b); for initial thoughts in this direction, see also Sinn, S. (1992).

imposes competition laws to hinder private monopolies, should we not expect competitive states themselves to have an interest in fostering cartelization in their national economies? An attempt will be made in this book to give a deeper and more precise meaning to the doubts expressed by the questions.

If the Selection Principle holds, then one can be optimistic about the working of the market economy because the market handles those allocation problems which it can handle. Almost by definition the market economy would perform quite well. On the other hand, it follows from the same argument that we have to be pessimistic about a 'marketplace' in which governments compete, because governments are coping with the rejects of the competitive process. Nothing could be more misleading than the usual conclusion by analogy from private competition to systems competition.

The historical selection of government tasks may also have come about partly by means of a competitive process. However, as explained above, this was not a systems competition forced by factor migration, but a process driven by the attempt to gain economic, cultural and military dominance. Such competition follows quite different laws from those which apply to migration-induced competition. Given the Selection Principle, it seems possible that the latter may destroy the results of the former.

The Selection Principle is in agreement with the rules and legal aspects of the development of the state as investigated in the traditional school of public finance as represented by Schäffle (1880), Sax (1887), Wagner (1876), Wicksell (1901), Lindahl (1939), Musgrave (1959) or Timm (1961), to mention only a few of the important figures. According to this school, the modern state necessarily accompanies the industrialization and urbanization which occurred as a result of the Industrial Revolution. It came into being primarily to remedy the intolerable state of affairs which characterized the end of the nineteenth century. The suffocating cities, the wretched living conditions of the proletariat, the poverty of the old, the catastrophic hygienic situations, and many other outrages resulted in a general need for government intervention in the market process which gradually, after various institutional and political impediments had been overcome, led to growing government participation. It was pressure of massive social problems that forced Bismarck to introduce his path-breaking reforms, and it was the power of the democratic majority vote that determined the further development of the modern state into a service

provider for its citizens. Despite all its weaknesses and problems, the state must be seen as an instrument for meeting the collective responsibilities which the private market cannot fulfil. It is not a result of an error of history, it is history's logical consequence.

### INEFFICIENT GOVERNMENTS AND SYSTEMS COMPETITION

Although the useful role of governments in the development of modern societies seems obvious, the modern state admittedly suffers from severe deficiencies in its internal decision-making process, as was explained by Buchanan and Tullock (1962), Olson (1965) and other members of the public choice school.<sup>5</sup> In a distributional political struggle between small and large groups, the small groups are always stronger than the large groups because in small groups the value per capita is higher and it is easier for its members to overcome the internal free rider problem in starting a political action. Governments and parliaments therefore tend to concentrate on legal reforms which make gifts to the few and charge the many, and these tend to be tax financed expenditures that favour rent seeking subgroups of the society. The maximization of national welfare is often incompatible with these reforms.

There is some hope that systems competition will reduce this type of internal inefficiency because mobile factors of production will prefer the less inefficient states and force the governments to choose their policies in line with the national interest rather than the wants of special interest groups.<sup>6</sup> This hope follows the same logic as the view that private competition eliminates inefficient companies or forces them to act efficiently. Indeed, much can be said for this logic under ideal market conditions. Inefficiently managed firms have high average costs and are forced to match the lower costs of efficiently managed firms to

<sup>5</sup> The public choice school founded by James Buchanan and Gordon Tullock has a pessimistic view of government. Buchanan, the 'libertarian socialist' and dyed-in-the-wool Southerner, has a deep-seated aversion to the state. The family trauma of the lost Civil War and the self-sufficient life on the farm where he grew up made him see in the central government a presumptuous authority whose power needs to be restricted (see Buchanan and Musgrave, 1999).

<sup>6</sup> For a criticism of this view see Edwards and Keen (1996) who showed that systems competition may even exacerbate the political distortions.

stay in business. The Main Theorems of Welfare Economics probably also apply, if the managers selected by the market process are too stupid or selfish to actively implement the conditions for maximum profit but clever enough to understand that they will have to mimic successful competitors in order to survive.

The problem, however, is that internal efficiency does not imply allocation efficiency as such. Consider the example of environmental pollution to clarify the point. Without competition, a management with a romantic, nature-loving orientation could survive but under competition it has no chance. Businesses that maximize their profits and minimize their private operating costs will prevail, and these are the environmental polluters.

The Selection Principle states that ideal market conditions tend to exist in private competition but not in competition between states, and this raises doubts as to the efficiency of systems competition even if national governments actively pursue a policy of national welfare maximization. For a similar reason as in the case of private firms, competition will force even the badly functioning governments to mimic their successful neighbours who managed to find better policy mixes with regard to the mobile factors of production, but such policy mixes need not be better from an international welfare perspective.

In this book it will be assumed that the behaviour of the individual country serves the goal of maximizing national welfare, given the behaviour of other countries. Despite, or better, because of the perfect achievement of this goal, systems competition turns out to be defective in a number of cases. As correct as the thesis that systems competition forces the nation state to seek national efficiency is, it does not follow from this that systems competition in itself is efficient.

The book does not assume benevolent politicians, but it abstracts from the distortions in the democratic voting process resulting from lobbying activities of the kind the public choice school has emphasized. It assumes a well-functioning democracy. Selfish politicians who want to be re-elected in a democratic voting process maximize domestic rents and choose policy moves that are Pareto optimal from a national perspective, for if they did not, they would be beaten by others who offer such policy moves. The focus is directed entirely on a study of the effective functioning and possible failures of systems competition when the competing countries themselves act rationally in the national interest. The name *systems economics* may be appropriate for this study area.

## SYSTEMS ECONOMICS AND THE HIERARCHY OF COMPETITIVE PROCESSES

Systems economics examines the functioning of systems competition under the idealized assumption that the national governments are not interested in the general welfare of all countries but in the well-being of their own citizens. Thus the methodological procedure of systems economics corresponds with the standard economic model used to analyse private allocation processes, which is based on the assumption of a rational individual choice by *Homo oeconomicus*.

Somewhat heroically the economist assumes that firms are capable of maximizing their profits and households are capable of maximizing their utility, disregarding the internal aggregation problems within these groups of individuals. These assumptions are not made because anyone believes that they are strictly true, but in order to avoid the danger of confusing failures in the rules of the game in which these groups participate with coordination failures inside these groups themselves. Problems in the internal organization of firms, deficiencies in the rules of conduct within a household or psychological inadequacies in people's minds are disregarded. This methodological constraint leads to policy recommendations that are free from dictatorial welfare objectives, satisfy the principle of methodological individualism and minimize the risk of calling for overdrawn government interventions. The analysis of coordination failures at lower levels of decision making is left to other disciplines including the economics of the family, business economics, psychology and sociobiology. Such failures are there, but they contribute little to the foundation of economic policy within a country.

A similar remark is appropriate for systems economics when the question is whether uncoordinated government actions lead to an efficient equilibrium. Here the national government is assumed to act like *Homo oeconomicus* in order to minimize the risk of fallaciously diagnosing a deficiency in systems competition and deriving an excessive demand for supra-national policy actions. It is true that there are failures within the political systems of the single countries involved, but once again such failures contribute little to the foundation of economic policy measures to be taken by centralized government bodies such as the European Parliament or the EU Council of Ministers.

The study of the internal deficiencies in the government sector can be left to the public choice school, which has specialized on this topic

and which itself makes similar abstractions on a lower level of the decision hierarchy. The public choice school assumes that politicians are rational agents and private markets function well, leaving the analysis of mental deficiencies and market failure to other disciplines. The public choice theorist knows that the failures of the internal political competition can only be isolated when clever, maximizing politicians, households and firms are assumed, and the systems economist knows that failures of systems competition can only be isolated when clever, welfare-maximizing governments are assumed.

Similar remarks can be made about the business economist and the family economist who, using the principal agent model, derive internal rules which lead to the desired success of the firm or household under the assumption of clever, utility-maximizing employees or household members. The principal agent model does not attempt to find rules that make dull employees behave efficiently but, instead, rules which encourage smart employees to work harder, and it explains the economic behaviour inside the household, assuming that the household members are rational agents rather than assuming that they are dunces.

Systems economics studies the competition between states. The public choice school studies the competition between politicians within a single state. Economic theory studies the competition between households and firms in private markets. Business economics studies the interaction between the employees within a firm. And the economics of the family studies the interaction of household members. Each of these disciplines looks at the interactions between individual decision makers, abstracting from the deficiencies inside the aggregates which they call 'agents'. They all assume that the agents of their models behave rationally, and ultimately they attempt to find rules and constraints that ensure the emergence of collectively rational actions that are compatible with individual rationality on the part of these agents. The business economist looks for internal worker-incentive structures that ensure profit maximizing behaviour within the firm. The family economist tries to find social norms or legal rules for economic behaviour within the family that result in a Pareto-efficient intra-household allocation of resources and a rational behaviour of the household in the marketplace. The economist, here especially the public finance economist, tries to optimize the government laws and regulations so that households and firms interact in an efficient manner. The public choice theorist tries to find constitutional rules which ensure that the politicians

**Table 1.1** Systems economics compared with other economics disciplines.

Discipline	Object of study	Rational actors	Normative level
Systems economics	Systems competition	Governments, parliaments	Federal constitution, harmonization rules
Public choice	Political competition	Politicians, voters	National constitution
Economic theory Public finance	Market competition	Households and firms	Laws and regulations, discretionary policy measures
Economics of the family	Interaction between family members	Individual family members	Rules of conduct and moral obligations
Business economics	Business organization, intra-firm competition and cooperation	Employees, managers	Remuneration systems, personnel management, structural planning, etc.
Sociobiology	Interaction of genes	Genes	—

act according to the wishes of their voters. And finally the systems economist will attempt to find welfare improving restrictions on the competition between economic systems that make the national governments behave efficiently. That this attempt has not yet got very far, because the theory of systems competition is still in its infancy, is quite another story.

Table 1.1 shows how systems economics fits into the edifice of economic disciplines. It also contains the category of sociobiology, because in a sense it is also part of this edifice. Sociobiology assumes that rational and selfish genes interact in the biological, evolutionary process so as to maximize their individual survival probabilities, and it points to a host of circumstances where individual survival maximization by the genes will not lead to collective maximization in the sense that a person's survival probability is maximized.<sup>7</sup> The kinds of problems treated in the theory of evolution are very similar to those analysed in the economic disciplines, and similar tools have been used to analyse them. The only difference is the lack of a normative component. Normative sociobiology in the sense of setting new rules for a better outcome of the evolutionary game among genes does not exist, except

<sup>7</sup> See Wilson (1975) and Dawkins (1976).

perhaps for the rules of targeted plant and animal breeding. Nevertheless a similar discipline might some day come into existence when competitive evolutionary processes are used to generate new computer generations and software programs. Certainly there is such a thing as good and bad rules under which the evolution of software programs should take place, and defining these rules would be similar to thinking about the legal superstructure of a market economy or the rules for a workable systems competition.

It is extremely difficult to comprehend the hierarchy of the competitive decision processes through which human actions are determined. Since the limitations of the intelligence of the social scientists (the author of this book included) mostly only allows one hierarchy level to be analysed at a time, appropriate simplifications may be made at this level which do not prove to be appropriate for the analysis at another level. The public choice theorist must question the assumption of the rational state made by the systems economist just as the economist and the sociobiologist may wish to put aside the public choice assumption of an efficiently functioning private competition and an efficiently operating brain of *Homo oeconomicus*. And the business economist can no more accept the economist's assumption of the profit maximizing firm, for then he would be superfluous, unable to earn his income. All this is not contradictory, because abstractions which are correct for all the questions that can be asked cannot be found in science.

Where rational economic behaviour is assumed as a simplification depends on which level of the human decision hierarchy is being studied. When, as this book does, the level of systems competition is studied, it appears reasonable to abstract from irrational or undemocratic government behaviour and assume that governments act in the interest of their citizens.

Despite the common assumption of rational economic behaviour, the different economic disciplines naturally cannot assume the similarity of the allocation mechanisms or the similarity of the technical constraints under which the respective decision makers act. It is precisely these differences on which the independent knowledge interests of the individual disciplines are established. The special aspects of the theory of systems competition are to be found in assumptions about the nature and determinants of international migration processes and the particular activities that the competing governments carry out.

## SYSTEMS COMPETITION: A CONSTRUCTION PRINCIPLE FOR EUROPE?

Understanding the new systems competition is important for Europe because this continent has entered a historical phase where the rules under which its countries interact are changing rapidly. A few decades ago, the borders of the European countries were closed for migrants, customs duties had to be paid on cross-border transactions, and most countries even had capital controls. Today, the customs duties and similar trade barriers have disappeared, capital controls and limitations of the right of residence among the EU countries have been abolished, and the countries participating in the Schengen Agreement have even dismantled their borders physically. People, goods, services and capital are able to move freely and unhindered between all countries of the European Union. The 'four basic freedoms' that were proclaimed in the 1957 Treaty of Rome have at last become reality, and soon these freedoms will be granted to the eastern European countries when they join the EU.

Under these conditions the question arises as to what the construction principle for the new Europe should be. What should be the rules under which the countries interact; where are decentralized actions allowed; where is harmonization useful and where is centralized action by authorities in Brussels required? These are eminently important issues for Europe which the economic discipline should try to address, but thus far its efforts have been small. Very little is known on this subject.

This book is a limited contribution to closing the knowledge gaps. It does not try to construct the rules for the new Europe, but it will try to check the validity of the frequently made recommendation to base the new Europe on systems competition, i.e. to wait and see how it evolves through independent actions of the single nation states without control or help from Brussels. The analysis will show that there are a number of attractive aspects about systems competition, but it will also show where the problems are and then make a few suggestions for corrective policy moves.

To make constructive recommendations for international European policy moves is a delicate matter, since a workable theory of bureaucratic behaviour is not available, and this book cannot offer one either. The recommendations should therefore be in line with the Subsidiarity Principle defined in the Treaty of Maastricht. The principle requires taking as little centralized action as possible. First, thought should be

given to whether the rules of systems competition can be improved. Next a jointly agreed-upon harmonization should be examined, and only then should a direct policy intervention of Brussels be considered.

The direct intervention of Brussels is problematic because it not only costs money but also leads to new dangers. These include misuse and the creation of further opportunities for successful rent seeking by interest groups. There are already reasonable doubts about the effectiveness of the Brussels administration. The impression that it is too strongly influenced by producers' interests and that too little attention is being given to interests of the European consumers cannot always be denied.

However, one must be careful not to throw the baby out with the bath water. A political nirvana model that measures the actual policies of the European Union against the noble ideal of infallible political decisions and denies these policies any justification as soon as they fall short of this ideal leads nowhere. What Demsetz (1969) demanded for judgements about private allocation processes can equally well be justified for political allocation processes. Reality always looks bad compared to utopias.<sup>8</sup>

It is certainly true that deriving political implications based on market failure is problematic because there may be government failure in the realization of a policy. A failure of systems competition must not automatically lead to an indiscriminate transfer of responsibilities to a central European government without careful examination. On the other hand, such a failure is a necessary condition for political interventions by the centre, and thus the economist should be allowed to think about sensible interventions. A ban on such thoughts, which many transaction costs economists would like, and the political nihilism that they preach, lead nowhere. When there is a failure in systems competition, it is completely reasonable to discuss alternative political measures for avoiding this failure.

That being said, it should be emphasized at this point that this book will not only analyse the failures of systems competition, it will also discuss potential ways to overcome them. In many cases the analysis will show that there is no failure, and, when there is, the policy recommendations will often involve the definition of better rules for the competitive interaction of countries rather than a plain harmonization. The refutation of the social dumping argument in chapter 4 is an example for the former possibility, while the recommendation of the home country principle for migrant welfare recipients in chapter 3 or

<sup>8</sup> See also Wittman (1995).

the self-financing constraint for public infrastructure in chapter 2 are examples for the latter.

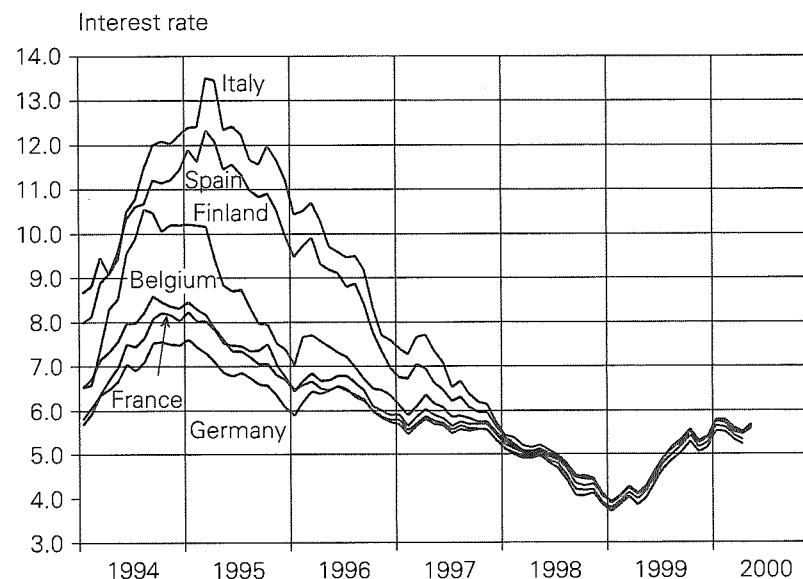
At the European Union's Nice Summit in December 2000, it was agreed to hold a new conference in 2004 to discuss the practical implications of the Subsidiarity Principle and to define the allocation of government functions to the different levels in the governmental hierarchy between local communities, provinces, nation states, and the administration in Brussels. An analysis of the workability of systems competition among the European nation states as is carried out in this book is a timely exercise in this context. It seeks to contribute rational arguments to the new European discussion, even though it cannot give ultimate answers.

## THE EURO AND THE INTEGRATION OF CAPITAL MARKETS

Free migration of capital and labour in a fully integrated economic space is the force that triggers off the new type of systems competition in Europe. There is no symbol which better characterizes this force than the euro, Europe's new common currency.

The euro not only symbolizes the political determination behind European integration, but it also has directly increased the mobility of factors of production and goods within Europe because it abolished the risk premia resulting from the volatility of exchange rates. These risk premia were very large. Some years ago, Italy and Spain, for example, had interest rates that were about 5–6 percentage points higher than German rates, and the investors in these countries had difficulties borrowing in international capital markets. The uncertainty of exchange rates was a substantial barrier to international transactions that segregated the capital markets even though all formal barriers had vanished. Private savers and borrowers were effectively excluded from many transactions, especially from taking international loans with long-term, fixed interest rates. Little capital therefore flowed from the richer to the poorer countries, and the driving forces of the new systems competition were effectively checked. This is now all long since past. The euro has created an almost perfect market for capital and goods within Europe, and unbridled competition for mobile capital has started.

The statistics available confirm this very impressively. While the standard deviations of the interest rates on ten-year government bonds and the inflation rates (national consumer prices) of the 11 Euroland



**Figure 1.1** Convergence in the European capital markets: long-term interest rates in Euroland.

Source: Deutsche Bundesbank (database).

countries<sup>9</sup> were still at 2.33 and 1.57 percentage points respectively in 1990, by Spring 1998 both had fallen to a minuscule 0.40 percentage points. Figure 1.1 illustrates the interest convergence for ten-year government bonds. It demonstrates how strong the euro's implications for the capital markets have been.<sup>10</sup>

<sup>9</sup> Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain.

<sup>10</sup> It is sometimes argued that capital market integration should be judged by real rather than nominal interest rate convergence, where real interest rates are defined as the difference between nominal rates and the respective national inflation rates. This view is fallacious, though. It is one of the fundamental efficiency requirements for a currency union that all countries' marginal value products of capital plus the respective national inflation rates (the 'own' rates of return) be equal, and profit maximization implies that this requirement is met if the nominal rates of interest are equal (see Dorfman, Samuelson and Solow, 1958). Efficiency can be expressed in terms of an equality of real rates, too, but then real rates will have to be defined by subtracting from the national inflation rates the rate of price increase of the *same* numeraire basket of commodities. Obviously, this procedure would imply the same perfect convergence as depicted in figure 1.1.

It has been suspected that the convergence of interest rates was the result of the sound fiscal policies enforced by the Maastricht Treaty rather than the elimination of the exchange risk. With a lower debt-GDP ratio, the risk of default is lower and so the risk premium can be lower. This view, as plausible and desirable as it was from the viewpoint of many central bankers, is not well founded in the data, though. If it were correct, the debt-GDP ratios would have had to decline significantly to produce the convergence pattern shown in the figure, but they did not. Even though the countries were forced to cut their budget deficits, the impact on the respective stocks of debt was small. Moreover, there was no visible relationship between the countries' debt-GDP ratios and the convergence of interest rates. Finland and Spain, for example, always had very moderate debt-GDP ratios, but nevertheless their interest rates participated in the smooth geometrical convergence process depicted in figure 1.1 just as those of the other countries did.

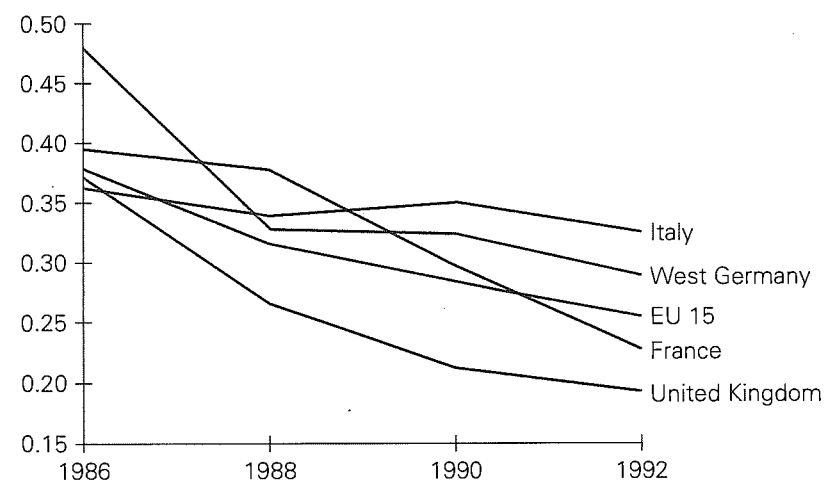
The euro will reinforce the kind of pressures and constraints that the capital markets have already imposed on Europe's national policy decisions in recent decades. The first sign of the importance of these constraints was the strong reaction of capital movements after Germany had introduced a withholding tax on interest income in 1989. The withholding tax had a rate of 10%, and it was meant to counter tax evasion. It led to a flood of capital exports in the first six quarters after the measure was taken that was far larger than policy makers had anticipated. A long-term capital import of DM3 billion in the year before the announcement turned into a long-term capital export of DM95 billion in the year following it.<sup>11</sup> The evasive reaction was so strong that Germany was forced to rescind its law only six months after it was introduced. The second attempt to tax interest income at source in 1992 only appeared to be more successful since the evasive reaction was avoided because interest income earned by foreigners in Germany was exempted from the start.

While the German withholding tax is a prepayment towards the personal income tax, which has no real significance for honest tax payers, Sweden and Austria were sufficiently impressed by the German experiment to even give up the principle of synthetic income taxation to improve their position in the competition for mobile capital. Instead of including interest income in the general income tax base, they

<sup>11</sup> See Nöhrbaß and Raab (1990).

burden interest income with a final and separate tax of only 30% and 25%, respectively. These were remarkable decisions, marking a new phase of tax competition. The competitive pressures have been so strong that the EU countries are now discussing harmonized minimum source tax rates for interest income.

Erosion phenomena also show up clearly with corporate taxes. Following the dramatic fall in tax rates from 46% to 34% which the United States decided on in 1986, many other countries undertook similar tax reforms of their own and also lowered their tax rates. Thus the average tax burden which the (current) 15 EU governments imposed on the US firms that operate within their borders fell by more than 12 percentage points between 1986 and 1992 (see figure 1.2).



**Figure 1.2** Average tax burden on subsidiaries of US corporations in Europe after 1986 US tax reform.

*Legend:* The average tax burden was calculated from information from US firms about income and taxes paid by controlled firms in Europe (i.e. firms which are at least 50% owned by American companies). The average tax burden is defined as the relationship between paid-out taxes and profits, where the latter are determined according to US rules for the preparation of balance sheets. The change of valuation rules to the determination of profits also finds expression in the average tax rates in this way. The average tax burden for the EU 15 uses national products as weights.

*Source:* Altshuler, Grubert and Newlon (1998), table 1A.

The trend remained unchanged in the period following the US reform. Even a large country like Germany was forced to change its corporate tax law substantially. In 1994 Germany introduced a so-called 'Location Preservation Law' which reduced its corporate tax rate from 50% to 45% for retained profits<sup>12</sup> (from 36% to 30% for distributed profits), and in the year 2000 Germany enacted a further, even more dramatic, cut in the corporate tax rate for retained profits from 45% to only 25%. Italian and French reforms to match this move are already under way.

Some of the smaller European countries felt the competitive pressure even earlier. Ireland has carried out a particularly aggressive industrial location securing policy since it joined the EU in 1973, being content with a corporate tax of only 10% for a limited number of sectors. In 1987 Ireland extended the regulations, which had originally only applied to manufacturing and special services, to financial services within the International Financial Service Centres in Dublin and at Shannon Airport. This led to a large flow of financial capital into Ireland which forced other countries, notably Germany, to take action against the transfer of assets from domestic parent companies to their Irish subsidiaries.

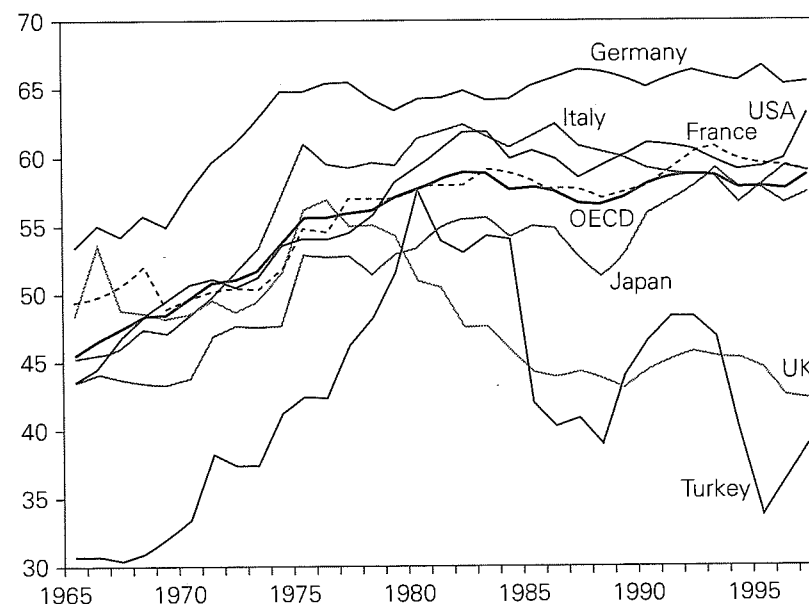
The Netherlands and Belgium have copied the Irish idea by also treating international financial investors very well. They charge financial service companies and holdings with the normal corporate tax rate, but allow these companies to make deductions of up to 80% of their revenues, which, in the Dutch case, effectively reduce the corporate tax rate to 7%.<sup>13</sup>

The erosion of corporate tax rates and the corresponding loss of revenue has partly been countered by an increase in labour taxes. Figure 1.3 shows the time paths of the labour tax share in the respective national tax revenues for a number of OECD countries as well as for the OECD average. On average this share increased from 45.5% in 1965 to 58.7% in 1997.

These trends of the past are likely to continue in the future because integration of the world capital market, and in particular the internal EU capital market, is proceeding fast. In the future there will be more rather than less fiscal competition, and this may erode the capital taxes

<sup>12</sup> In 1999 corporate tax for retained profits has been further reduced from 45% to 40%.

<sup>13</sup> See Mennel and Förster (1999).



**Figure 1.3** The increasing share of labour taxes in the OECD countries.

*Legend:* (1) The OECD labour tax share is measured as the GDP weighted average of each member country's share of labour taxes in the respective total tax revenue. (2) Labour taxes are calculated as the sum of individual income taxes, social security contributions, and taxes on payroll and workforce. (3) Tax data on Mexico, Iceland and South Korea were not available. Eastern European OECD countries (Poland, Czech Republic and Hungary) are not included.

*Sources:* OECD Revenue Statistics (1999), OECD National Accounts (1999), own calculations.

further, forcing labour taxes to fill the increasing gap. The factor labour could be the victim of systems competition.

## MIGRATION IN EUROPE

The shift of the tax burden from capital to labour income is likely to result from the fact that labour markets are less integrated than capital markets and that the fiscal competition in these markets is therefore much lower. Up to now different languages and cultures as well as remaining institutional hindrances in the labour markets have prevented

most people from leaving their native countries in the light of the existing wage differences in Europe, and hence these differences disappear only gradually with the passage of decades rather than years (cf. chapter 4).

Wages definitely have not converged like interest rates (figure 1.1). In 1998 the Irish hourly wage costs in manufacturing were only €12, while in west Germany they had reached a level of €24. With a weighted average of the EU hourly wage costs of €17, the standard deviation of these costs was €5. That is, wages in about one-third of jobs deviated from one another by more than €10.<sup>14</sup>

Despite the relatively large degree of inflexibility in the labour markets, it would however be wrong to ignore the mobility currently available to workers in Europe and the foreseeable increase in flexibility in the decades to come. The freedom to settle anywhere in the EU, which has been legally available since 1970, and the freedom to provide services, which was fully granted in 1992, have led to a new situation which may require a revision of the conventional wisdom that labour mobility is negligible.

Apart from the internal EU migration, which has yet to develop, there was already a strong movement of labour in the years following the fall of the Iron Curtain in 1989. People who for decades had been imprisoned in the communist countries saw a way to escape, and a mass flight to the west resulted until the west itself increased its entry barriers by tightening its asylum laws. The post-communist migration flows culminated in the year 1992, when Germany alone absorbed more than 800,000 immigrants. Figure 1.4 gives an overview of the European migration flows in the peak year 1992.

Immigration to Germany was particularly high at that time because Germany had Europe's most liberal immigration law, giving political refugees from all over the world the legal right to apply for asylum. Meanwhile, the asylum law has been modified so that it is more in line with other countries, and the immigration flows have shrunk accordingly.

However, the official immigration figures do not capture the illegal immigration, which may be substantial. Most of the illegal German immigrants come across the Czech border, since this border is no longer fenced in and the inhabitants of the former Eastern Bloc can

<sup>14</sup> The employment figures in manufacturing in the different countries were chosen for the weights. See Eurostat, *Eurostatistik: Daten zur Konjunkturanalyse*, vol. 3, Brussels, 1998, p. 46; and Schröder (1999).

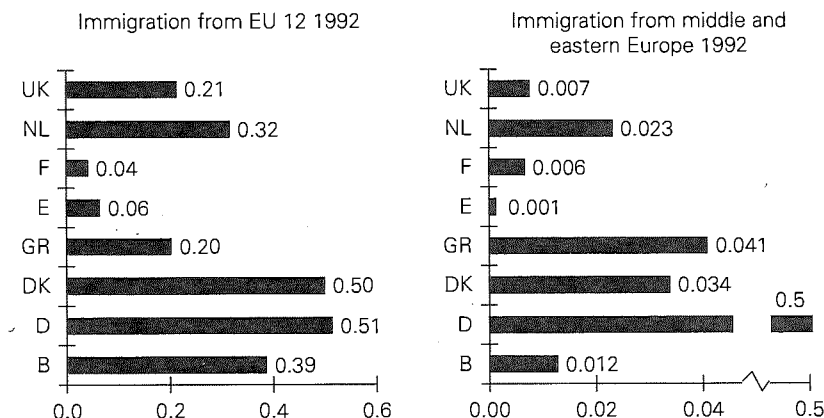


Figure 1.4 Migration in Europe 1992.

Legend: Gross immigration as percentage of the total population of immigrant country.

Source: Eurostat, *Wanderungsstatistik 1994*, pp. 41, 42.

enter the Czech Republic without visas. The random checks by the German customs and immigration officers make the entry of the economic refugees from eastern Europe difficult, but not impossible.

On the whole, the size of the migration flows is not yet quite comparable to the wave of immigration into the United States at the turn of the century. Annual US immigration between 1900 and 1910 was on average around 1% of the US population.<sup>15</sup> In comparison, (legal) immigration in western European countries was on average only 0.35% between 1980 and 1992.<sup>16</sup> Only Germany had figures resembling those of the US for some of these years. Nevertheless, the European population movements triggered off by the fall of communism can be classified as large. In many places they have led to considerable popular resistance, put pressure on the labour markets, and caused substantial burdens for the social systems of western Europe. Half of the immigration to Germany during the 1990s was an immigration into unemployment and welfare receipt.

<sup>15</sup> *Encyclopaedia Britannica*, 'Migration', vol. 15, London, 1957, p. 466.

<sup>16</sup> United Nations Population Fund, *The State of World Population*, 1993, New York, p. 16, and database; Summers et al., Penn World Table, Mark 5.6a; own calculations.

From a theoretical perspective, labour migration should be particularly important at the top end of the income scale, and indeed rich people have increasingly transferred their domiciles to low-tax countries in recent years. The richer someone is and the more taxes he or she can avoid, the less important the costs of such transfers become and the stronger the incentive to carry them out.

However, in fact, the migration at the bottom end of the income scale dominated due to the waves of refugees from eastern and south-eastern Europe during the 1990s. The migrants from these regions tried to move into the EU to get away from the catastrophic economic and political situation in their own countries, and only the severe constraints imposed by western countries kept the migration in check.

Migration at the lower end of the income scale will strongly increase when the east European countries become EU members, because then the right of residence will be granted for the purpose of working in another EU country. In the year 2000 there were entrance negotiations with Estonia, Lithuania, Latvia, Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Malta and Cyprus, and it is expected that, perhaps with the exception of Cyprus, these countries will join the EU around the year 2004. In total, 75 million people or 20% of the current EU population are expected in the first accession wave, and another 30 million are still waiting for accession, not counting Turkey with its 70 million inhabitants.

It is unclear how many of the east Europeans will migrate to western Europe, but the potential is large because the economic situation in eastern Europe is still far from satisfactory. In 1998 the average wage cost per hour was only 13% of that in west Germany in the first-wave applicant countries. Even under very optimistic assumptions it will not be possible to increase the wage rate above one-fifth of that in west Germany until the scheduled time of joining the EU. Therefore, large migration flows must be reckoned with. According to an econometric study by Sinn, Flaig, Munz and Werding (2001), between 3 and 4 million people will migrate to western Europe from the first wave of accession countries over a period of 15 years. A poll conducted by the International Organization for Migration (1998) suggests even higher emigration figures.

It has been argued that the example of southern expansion by integrating Spain and Portugal has shown that there will not be much migration after EU accession. However, for at least two reasons the Iberian example does not fit to the east European case. First, wages

were much higher. Measured at current exchange rates, they were 47% of the west German wages rather than 13% in the east European case. Second, most potential migrants had already left their countries before the time of EU accession. Between 1960 and 1974, the time when the dictatorships in Portugal and Spain ended and EU membership was prepared, no less than 5.5% of the Iberian population had emigrated in net terms, even though there was much immigration to Portugal and Spain from its former colonies in this period. These emigrants could not emigrate a second time when the EU membership came, and in fact many of them returned to their home countries. The crucial difference with eastern Europe was that during the time of the Iberian dictatorships there was no Iron Curtain to prevent people from emigrating. The Iron Curtain had maintained the emigration pressure in eastern Europe and shortly after it was lifted the western countries tightened their immigration laws, erecting a legal barrier instead of the physical barrier. If this legal barrier is lifted too, the migration flows from eastern Europe will be substantial.

Given the size of the wage differential with eastern Europe, the foreseeable migrations as such are not indicators of high, let alone perfect, labour mobility. It is only people's expectation that their own income can increase many times over that triggers mass migrations. However, the east-west migration will imply that there is almost perfect *differential mobility* between the western European target countries, and such a differential mobility is likely to be enough to set the systems competition in motion. Anyone who decides to turn his back on his own country will make the choice of the target country primarily dependent on economic conditions and will be guided by even the smallest differences in expected living standards. This in turn will motivate the European governments to think hard about the designs of their welfare systems.

### QUO VADIS EUROPE?

The direction in which the new Europe will develop under the influence of people and production factor mobility is one of the most important questions of the time, but its answer is not yet known. Too little is known about the mechanisms of the competition between systems.

*That* there will be dramatic changes is obvious. The signals that will put the national governments on the alert are mounting in any case.

Welfare states like Holland and Sweden have carried out great debates about industrial location which have resulted in fundamental reform of the government sector and the labour market institutions. In Germany such a debate is in progress, and very substantial reforms of the tax and pension systems have been carried out.

It is not clear where the tax competition will lead and it is also not known what changes in government expenditures will result. In the end a location decision depends not only on tax rates, it also depends on the legal regulatory framework that a country has to offer, and on the amount of total government expenditures that are tax-financed. Firms that are willing to relocate may well be prepared to pay higher taxes for a good infrastructure.

It is also not clear how the political integration of Europe will proceed alongside the intensification of systems competition. The range of possibilities includes an uncontrolled systems competition, the development of a regulatory framework for this competition, a political agreement to harmonize fiscal conditions and finally the establishment of a new European central government with extensive sovereignty and budgetary rights.

Given the multitude of opinions, it borders on clairvoyance to attempt to make a prediction about the extent of political integration in Europe. Nobody knows how quickly the political union will go ahead and what the final state will be. This book makes no prophecies, it only offers conditional predictions for the theoretical case of unbridled systems competition and political counter measures that would falsify the predictions should they not be pleasant.

## 2

# Taxes and Public Infrastructure Goods

## COMPETITION BETWEEN FISCAL SYSTEMS

There is no better example of the way systems competition works than tax competition. Everywhere we look there are tax reductions which have been triggered off by this competition. The examples of the falling effective tax rates for the European subsidiaries of US parent companies and the increasing share of labour taxes cited in chapter 1 speak volumes. Globalization has meant that a great many countries are now facing tax competition. The corporate tax rates of all the G7 countries except Italy have fallen in the last 20 years, most of them by more than 10 percentage points. Every country is trying to become an attractive location for investment and the offers being made to willing investors are continually rising. Ireland is using special free trade zones to attract investment, Sweden and Austria have given up the principle of synthetic income taxation, burdening interest income with tax rates that are substantially lower than those on personal income, and Germany has reduced its corporate tax rate from 40% to 25%. It is said that Alabama made Mercedes a tax gift whose value equals 30 years of tax payments to persuade it to locate there. Even Luxembourg believes that it must reduce its already low taxes still further to defend itself against this competition.

A country's attractiveness does not, of course, only depend on its tax rates. The stability of its legal system, protection of property, social harmony, and, not least, its public infrastructure all have a considerable influence on the returns a foreign investor can expect to earn

there. This indicates the existence of a natural barrier which weakens the erosive powers of tax competition – when government services cease to be affordable it is no longer possible to attract more capital by reducing taxes still further.

Nevertheless, one should not be too quick to jump to firm conclusions because, regardless of how useful government services are for mobile capital, the suppliers of immobile factors could always choose to finance these services themselves. Whether and to what extent it is in the national interest to tax mobile capital, and whether the efficient provision of public services is endangered, are not trivial questions. These are the questions which will be discussed in this chapter. To analyse the problem, the level of abstraction is successively reduced. First, a model without public goods will be treated, then a public infrastructure will be added, whose costs are proportional to the capital employed, and finally a realistic type of infrastructure good will be introduced that is used by many firms jointly, that involves congestion externalities, and whose supply is only loosely related to the capital employed.

### THE STANDARD ARGUMENT

The argument on which practically all the literature on tax competition is based comes from MacDougall (1960) and Richman (1963). Both these authors have pointed out that a small open economy can have no interest in putting a source tax on internationally mobile capital because capital will always be able to shift the tax burden. The source tax drives away mobile capital, and the domestic product and the marginal productivity of the complementary immobile factors both fall. The income of these factors declines, and does so by more than it would if the factors were to pay the tax themselves.

The argument can be shown in a simple way in figure 2.1, which relates to the decision situation of a single country. The country produces a homogeneous output using labour  $L$  and capital  $K$ , where  $f(L, K)$  is a linearly homogeneous production function with the usual properties. The amount of labour employed is fixed and is provided by domestic residents. The amount of capital employed is variable. Capital is internationally mobile and is available in any amount at the net world market return  $r$ . The downward sloping line shows the marginal product of capital. When there is no tax, firms invest up to the point where  $f_K = r$ ; that is, they choose the amount of capital  $K_1$ .

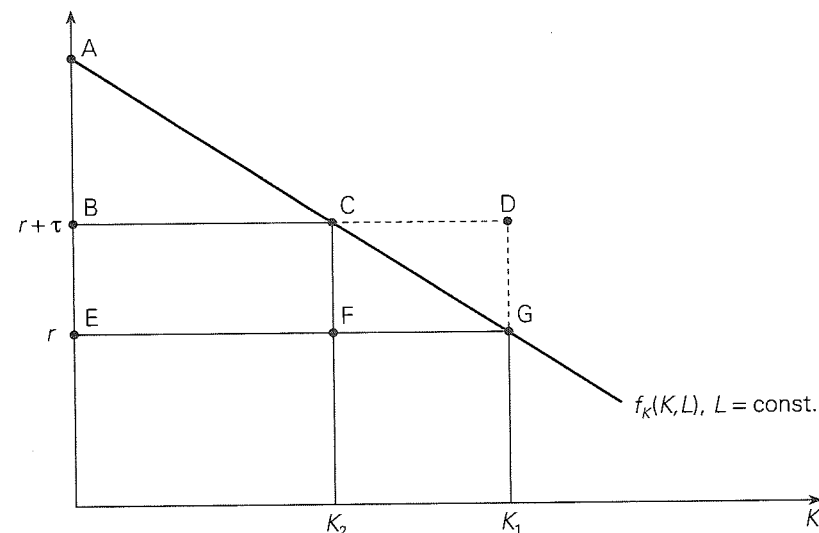


Figure 2.1 The erosion of source taxes in tax competition.

If the government imposes a source tax on capital equal to  $\tau = BE$ , the amount of capital used will fall to  $K_2$ . As the net return  $r$  is given in the world market, capital leaves the country until its net marginal product after tax is again equal to the given world market level:

$$f_K - \tau = r.$$

The tax is shifted completely to the immobile factor. Before taxation the wage income was AGE and when capital leaves it falls to ACB. The tax revenue, which is BCFE, is obviously smaller than the reduction in wages, which is BCGE. Even if the total tax revenue were paid to the wage earners, these would face a loss of CGF. Attempting to tax mobile capital would hurt the owners of the immobile factor themselves. The equilibrium in tax competition between states is therefore  $K_1$ .<sup>1</sup>

Whether the mobile capital is domestic or foreign is irrelevant for this reasoning, because, given that the return on the world market is constant, each wealth owner's income from capital is independent of

<sup>1</sup> The argument just described has become the basis of the new discussion of tax competition. See, for example, Razin and Sadka (1991).

how much capital he invests in the particular country. In a symmetrical international equilibrium it can be assumed without a loss of generality that the wealth  $\bar{K}$  of the residents of the country is the same as the equilibrium amount of capital used,  $K_1$ .

## COMPETITION WITH INFRASTRUCTURE GOODS

The role of government infrastructure investment is often used as evidence against the pessimistic view of the workability of systems competition based on the results of the previous analysis. It is not only a country's tax burden that is important for location decisions, its infrastructure is important, too. If taxes are seen as the price that must be paid for the publicly provided infrastructure, the investors will accept them. This means that, from the isolated viewpoint of an individual country, it is rational to impose such taxes. A destructive systems competition does not have to be feared.<sup>2</sup>

Figure 2.1 can once again be used to illustrate the infrastructure argument, where  $r$  is now to be interpreted as the given net return of capital in countries with a functioning infrastructure. Assume that infrastructure costs per unit of capital are  $BE$ , so that total infrastructure costs with  $K_1$  capital employed are equal to  $BDGE$ . In this case it is not sensible for the country to forgo imposing a source tax even when, in principle, it could tax the immobile factor. The reason is easy to see. If the immobile factor pays the tax, its income is  $AGE - BDGE$ , that is,  $ACB - CDG$ . If the mobile factor pays the tax and  $\tau = BE$ , the amount of capital used falls to  $K_2$ , the infrastructure will be financed by the tax on capital, and the income of the immobile factor, which is no longer being taxed, will be  $ACB$ . It is larger by the size of the triangle  $CDG$  than if this factor were to pay the tax.

The infrastructure argument is not really convincing in the form used because the infrastructure is modelled as if it were a private intermediate product which has to be used in a fixed proportion with capital. In reality, the public infrastructure is an impure public good with a limited rivalry between competing uses. The state cannot set the tax price for consuming a unit of infrastructure but can only charge for the act of using it jointly with others, and using it does not involve any direct production costs. All that usage imposes are

<sup>2</sup> See Oates and Schwab (1988), Wellisch (1995) or Oates (1995).

congestion costs which other users have to bear. Pecuniary costs are involved when the infrastructure is improved, but that is a separate government decision.

There is a series of papers which generalize the infrastructure argument to the case of congestion costs. As well as the 'club goods' literature, it includes papers like those of Boadway (1980), Sandler and Tschirhart (1980) or Berglas and Pines (1981). The papers of Gerber and Hewitt (1987), Richter (1994) or Richter, Seitz and Wiegard (1996), which follow on from Wildasin (1986), should especially be mentioned. These papers, as a whole, come to an optimistic assessment of systems competition.

However, there are also pessimistic voices. Bewley (1981) argues that increasing returns to scale in the production of infrastructure goods prevents a competitive equilibrium, and Pines (1991) shows that such an equilibrium probably does not exist when the economies are not 'replicable'. Zodrow and Mieszkowski (1986) argue that this leads to underprovision of the public infrastructure for private investment.<sup>3</sup>

On the basis of the Selection Principle, this study comes to an ambiguous conclusion about the workability of systems competition between states which take part in infrastructure competition. The study abstracts from the problem of replicability which Pines examined, and it contradicts Zodrow and Mieszkowski's argument. To some extent, it can be interpreted as a generalization of Bewley's analysis to the case of public goods. Bewley examined a publicly provided private good. Here, however, a public infrastructure good will be considered, which is a public good in the sense that it is jointly consumed by all users and cannot be separated among them. To avoid any obvious bias against a market solution, rivalry in use, in the sense of the congestion costs mentioned, will be assumed. This provides an efficiency motive for imposing compensatory taxation, and given that there is a tax revenue it can be used to finance the infrastructure. The approach will be compared with the theory of private clubs, in order to find suitable assumptions for the analysis of systems competition, and used to discuss various policy measures to improve the outcome of systems competition.

<sup>3</sup> This argument should not be confused with the view that tax competition leads to an underprovision of public consumption goods. For this see the overview article of Wilson (1999). The issue will be extensively discussed further below in this chapter.

## FISCAL COMPETITION AND IMPURE PUBLIC GOODS

An approach is chosen for analysing the infrastructure argument which is familiar from highway congestion models. Using a highway incurs a private unit cost  $c(K, W) > 0$  for the user, such as petrol, car depreciation and the like. The size of this cost depends on the number of usage acts,  $K$ , and the capacity of the infrastructure provided by the government,  $W$ . Think, for example, of the number of trips over the highway and the width of this highway. It is not by chance that the variable  $K$  stands for both the number of usage acts and the amount of capital employed. It is assumed that the two variables are proportional to one another so that, with an appropriate choice of units, they can be taken to be equal numerically. The properties of the usage cost function are given by the derivatives  $c_K \geq 0$  and  $c_W < 0$ . When  $c_K = 0$  we have a pure public good in the sense of Lindahl, Musgrave and Samuelson for which there is no rivalry in use. Where  $c_K > 0$  we have an impure public good where the users get in each other's way. It is assumed that the function  $c$  is homogeneous of degree  $\lambda$  where the sign of  $\lambda$  is still to be determined. The usage cost function was first used by Mohring and Harwitz (1962), and it is well known in the literature on congestion externalities.<sup>4</sup>

The usage cost is quite distinct from the production cost of the public good. Without limiting the generality, it can be assumed that the production cost per unit of capacity has the fixed value  $\rho > 0$  so that the total cost for the provision of the public good is  $\rho \cdot W$ . By contrast, the total cost of using the public good is  $c(K, W) \cdot K$ .

As before it is assumed that a homogeneous output is produced according to the linearly homogeneous production function  $f(K, L)$ , where  $K$  is the amount of capital employed and  $L$  the amount of labour employed. Capital is completely mobile internationally and, for the time being, labour is assumed to be completely immobile – it is inelastically supplied and cannot migrate across borders. The net return  $r$  which the capital can earn in other countries after tax and after deducting the usage cost of the infrastructure is constant from the point of view of the (small) individual country. The country only has

<sup>4</sup> Cf. Oakland (1972) and Boadway (1980). For the role of public goods in the production function, see also Pfähler (1995).

a source tax on capital and a head tax on labour available to it and these are raised at the rates  $\tau$  and  $\omega$ .<sup>5</sup> The residents of the country have a fixed amount of wealth,  $\bar{K}$ , which they can invest at home or abroad. Their capital income is  $r \cdot \bar{K}$ .

Profit maximizing firms invest capital up to the point where the marginal productivity of capital is equal to the sum of the marginal interest, usage and tax costs:

$$f_K(K, L) = r + c(K, W) + \tau. \quad (2.1)$$

It should be noted that  $c(K, W)$  measures both the average social usage cost and the marginal private usage cost. The marginal social usage cost on the other hand is  $c + c_K \cdot K$ , where  $c_K \cdot K$  is a marginal congestion externality which the representative firm does not take into account in its planning. In what follows,  $\tau$  and  $W$  are taken to be the choice variables of the government. The lump sum labour tax rate  $\omega$  is endogenously determined such that the government budget is balanced:

$$\omega L = \rho W - \tau K. \quad (2.2)$$

Note that this equation holds algebraically and is compatible with any sign of the labour tax revenue. If the tax on capital generates more revenue than needed for the provision of the public infrastructure, there will be a subsidy to labour to balance the budget. Taking account of the constraints (2.1) and (2.2), the government's aim is to maximize the rents  $R$  of the domestic residents.  $R$  is the sum of the gross wage income, which is output minus the return to the factor capital,<sup>6</sup> and the net interest income, minus the labour tax whose revenue is needed to cover a potential deficit in the provision of the infrastructure:

$$R = (f - f_K \cdot K) + r\bar{K} - \omega L. \quad (2.3)$$

Inserting (2.1) and (2.2) into (2.3) gives the expression

$$R = f(K, L) - r(K - \bar{K}) - c(K, W)K - \rho W. \quad (2.4)$$

<sup>5</sup> For analytical convenience, the source tax is modelled as a periodic levy on the stock of capital rather than on the return of capital.

<sup>6</sup> It should be noted that the assumption of a linearly homogeneous production function ensures that  $f - f_K \cdot K$  is just sufficient to pay the employees their marginal productivity wage  $f_L \cdot L$ .

This shows that the total rent can also be expressed as the difference between the output and the sum of the interest cost of the imported capital, the total usage cost, and the total cost of providing the public infrastructure. Equation (2.4) contains an implicit tax shifting result which is due to the fact that, according to (2.1), firms adjust competitively to the given world market rate of interest. Given that the single country can take the total capital income  $r \cdot \bar{K}$  as given and the labour tax clears the budget, variations in the usage cost  $c \cdot \bar{K}$  and the cost of providing the infrastructure,  $\rho W$ , are fully absorbed by the income of the immobile factor (labour).

Knowing this, the government tries to adjust the tax rate  $\tau$  and the capacity of the public good  $W$  in a way that maximizes the rent of domestic citizens. As (2.1) shows that  $K$  is a monotonically declining function of  $\tau$ , this also implies that (2.4) can be maximized by the choice of  $K$  and  $W$ . The first-order conditions for a national policy optimum are

$$f_K = r + c + c_K \cdot K \quad (2.5)$$

and

$$-c_W \cdot K = \rho. \quad (2.6)$$

Equation (2.5) requires that the marginal product of capital equal the marginal social cost of capital which is the sum of the marginal interest cost  $r$ , the marginal individual usage cost  $c$ , and the marginal congestion externality  $c_K \cdot K$ . Equation (2.6) is the Samuelson condition for the optimal provision of public goods. If the capacity of the public good is increased by one unit, the usage cost 'per trip' changes by  $c_W$ . The negative of this value is the marginal willingness to pay per trip. The multiplication with  $K$  is the same as summing over all trips. The condition therefore says that the sum of all users' marginal willingness to pay be equal to the marginal cost of providing the infrastructure.

### *The optimal benefit tax rate*

Comparing (2.1) with (2.5), it can be seen that, in order to achieve the optimum, the government sets a tax rate equal to the marginal congestion externality:

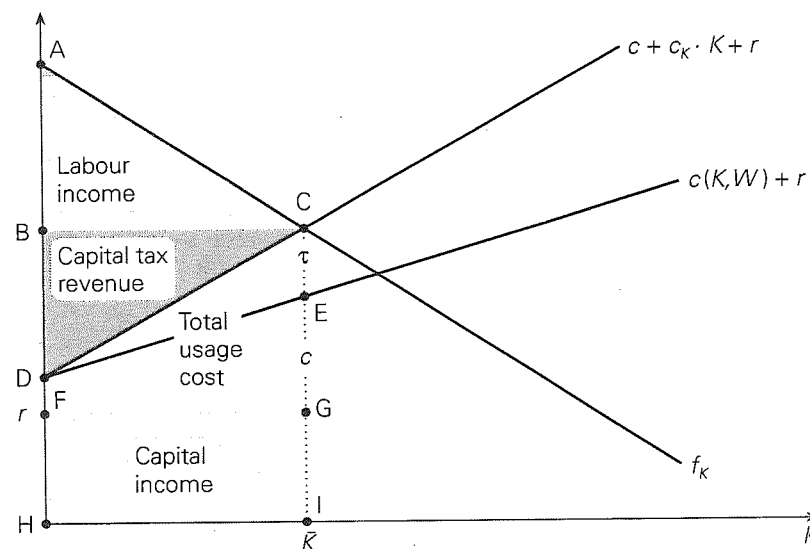


Figure 2.2 The optimal compensatory tax rate.

$$\tau = c_K \cdot K. \quad (2.7)$$

This is not the same as the choice of an optimal tax rate equal to the marginal cost of providing a private infrastructure good shown in the previous section, because this cost bears no obvious relationship to the congestion cost.

The choice of the optimal tax rate is illustrated in figure 2.2. Here a symmetrical equilibrium is assumed, in which every country invests as much as it owns,  $K = \bar{K}$ . The figure shows the level of the internationally given net return  $r$ , the private marginal cost of capital  $c + r$ , the social marginal cost of capital  $c + c_K \cdot K + r$ , and the marginal product of capital  $f_K(K, L)$ . The area under the marginal product curve represents total output, and the area under the social marginal cost curve represents total social costs. The total rent is the difference between the two areas, ACD, plus the fixed capital income  $r \cdot \bar{K}$  (i.e. the area FGIH) and minus the cost  $\rho W$  of providing the public good, which is not shown in the figure. It is obvious that total revenue is maximized at the intersection of the two curves. The resulting tax rate  $\tau$  is CE, and is exactly equal to the marginal congestion externality. A higher tax rate would drive too big a wedge between  $f_K$  and  $c + r$ , and

a smaller rate would drive too small a wedge between them; too little or too much investment would thus be induced.

In accordance with equations (2.2) and (2.3), the total rent can also be shown as the sum of labour income, capital income and capital tax revenue minus the cost of providing the infrastructure. In the optimum, labour income equals ACB, capital income equals FGIH and capital tax revenue equals BCD. The latter follows from the fact that the sum of the interest cost FGIH, the usage cost DCGF and the capital tax revenue is equal to the gross income BCIH that accrues to capital.<sup>7</sup> If  $K$  falls below  $\bar{K}$ , the sum of labour income and capital tax revenue is reduced because a triangle to the left of point C must be taken from the corresponding area in figure 2.2. The sum of labour income and tax revenue is also reduced by a triangle to the right of C if  $K$  is increased beyond  $\bar{K}$ . Thus, the sum of labour income and tax revenue is maximized at point C.

## THE SOCIAL OPTIMUM

How does the competitive equilibrium thus characterized compare with the international social optimum? Suppose there is a supra-national central planner who chooses the international capital allocation and the respective national provisions of public goods such that the sum of all rents is maximized. As the aggregate stock of capital invested equals the given aggregate stock of wealth, the planner's goal can be taken to be

$$\max_{K_i, W_i} \sum_{i=1}^n R_i = \sum_{i=1}^n f(K_i, L_i) - c(K_i, W_i)K_i - \rho W_i \quad \forall i = 1, \dots, n,$$

$$\text{s.t. } \sum_{i=1}^n K_i = \sum_{i=1}^n \bar{K}_i,$$

<sup>7</sup> It can also be seen that BCD represents the tax revenue when it is considered that  $\tau \cdot K = (\tau + c)K - K \cdot c$  and  $K \cdot c = \int_0^K [c(u, W) + c_u(u, W) \cdot u] du$ . If  $K = \bar{K}$ ,  $(\tau + c)K$  corresponds to the rectangle BCGF and the integral (the usage cost  $K \cdot c$ ) to the white area DCGF. The difference between these areas is the triangle BCD. It is equal to the capital tax burden  $\tau \cdot K$ .

where the subscript  $i$  denotes a particular country and  $n$  is the total number of countries. It can easily be shown that, in the optimum, it is necessary that

$$f_{K_i} - c(K_i, W_i) - c_{K_i} \cdot K_i = f_{K_j} - c(K_j, W_j) - c_{K_j} \cdot K_j \quad \forall i, j = 1, \dots, n,$$

which says that the marginal product of capital net of the marginal social cost of using the infrastructure be equal in all countries. This is an obvious generalization of the usual requirement for an efficient allocation of a given stock of capital to competing uses. It coincides with national optimality condition (2.5) since there is a common rate of return to capital  $r$  for all countries. (Firms invest up to the point where their respective marginal product of capital net of the national source tax and net of the private infrastructure usage cost equals the common rate of return and national governments impose source tax rates that equal the marginal congestion externalities.) Similarly, the central planner's marginal condition for an optimal provision of public goods,

$$-c_{W_i} \cdot K_i = \rho \quad \forall i = 1, \dots, n,$$

coincides with national optimality condition (2.6). A proposition summarizes this result.

**Proposition 2.1:** *The equilibrium in systems competition is efficient. Both the international allocation of capital and the pattern of infrastructure provision are chosen so as to maximize the sum of all rents accruing in all countries.*

Proposition 2.1 sheds a rather favourable light on systems competition from an efficiency perspective. The Invisible Hand does seem to work in the context of systems competition, and the pessimism implied by the Selection Principle seems unfounded. Unfortunately, however, the distributional implications of this equilibrium are less convincing, and there may even be existence problems. These issues will be considered in the next few sections.

## WHO PAYS FOR THE INFRASTRUCTURE?

As to the distribution problem, the relevant question is: how high is the congestion-driven capital tax revenue the single government collects in systems competition relative to the cost of providing the public infrastructure? Will the competitive government be able to demand from capital a contribution to financing the budget which exceeds the cost of accommodating this capital? Or must the government accept a deficit which would have to be covered by a levy on the fixed factor?

That the latter is a relevant possibility is obvious when the infrastructure is a pure public good. There is no rivalry between the users ( $c_K = 0$ ) with pure public goods and thus no tax is levied to internalize the marginal congestion cost. The immobile factor bears the burden of paying tax alone. (In figure 2.2 the social and private marginal cost curves become horizontal and the area BCD that represents the tax revenue shrinks to zero.)

The assumption of a pure public good is, however, not realistic. In the more general case of strictly positive congestion externalities, there is a revenue from capital taxation, but it is not clear whether it is sufficiently large to finance the infrastructure. To see how the capital tax revenue is related to the cost of providing the infrastructure, note that Euler's Theorem implies

$$c_K \cdot K + c_W \cdot W = \lambda c \quad (2.8)$$

where  $\lambda$  is the degree of homogeneity of the usage cost function  $c(K, W)$ . Inserting the maximization conditions (2.6) and (2.7) into (2.8) gives the expression

$$\tau K = \rho W + \lambda c K. \quad (2.9)$$

The basic insight of this formula, which has already been gained by Mohring and Harwitz (1962, pp. 85–7), can be formulated as follows.

**Proposition 2.2:** *The optimal congestion charge is sufficient to finance the public infrastructure when  $\lambda \geq 0$ , that is, when the usage cost function does not have a negative degree of homogeneity. If  $\lambda < 0$  there will be a fiscal deficit that must be covered by taxing the immobile factor.*

To understand the importance of the degree of homogeneity, it can be asked whether the average usage cost of the public infrastructure falls, rises, or remains constant when both the number of usage acts (trips) and the cost of providing the infrastructure double. In the first case  $\lambda < 0$ , in the second  $\lambda > 0$  and in the third  $\lambda = 0$ . Analogously, it can be asked by how much must the public expenditure on the infrastructure increase in order to keep the average usage cost, and thus the perceived quality of the infrastructure, constant when there are twice as many usage acts. If, for example, the expenditure must more than double, then  $\lambda > 0$  and self-financing of the infrastructure with an efficiently designed congestion charge is warranted. Conversely, the optimal congestion charge is not sufficient to finance the infrastructure if less than doubling the public expenditure suffices to keep the quality of the infrastructure constant when the number of usage acts doubles ( $\lambda < 0$ ).

The problem is broadly equivalent to the problem of returns to scale in the production of a private good. Only when there are falling or constant returns to scale will marginal cost pricing generate enough revenue to cover the total cost of production. However, when there are increasing returns to scale, there is a financing deficit which has to be covered elsewhere, similar to the case of pure public goods. This is the case supporting the pessimistic suspicion of chapter 1 that wage earners are the victims of systems competition.

## THE SELECTION PRINCIPLE, THE THEORY OF CLUBS AND THE RACE BELOW THE BOTTOM

What is now the appropriate assumption about the sign of  $\lambda$ ? At first sight  $\lambda \approx 0$  would appear to be plausible as constant returns to scale is one of the usual assumptions of microeconomic production theory. But one needs to be careful here. An uncritical use of assumptions from the theory of private markets is not permissible in the light of the Selection Principle introduced in chapter 1 because it neglects the reasons that induced government intervention. If governments do what they ought to do and do not provide public goods which could also be provided by private clubs, arbitrary assumptions about the size of  $\lambda$  would not be appropriate.

A look at the theory of clubs as derived by Buchanan (1965), Boadway (1980) and Berglas and Pines (1981) quickly shows which

assumptions about  $\lambda$  the Selection Principle requires. It is assumed that there are  $i = 1, \dots, m$  identical private clubs which supply the infrastructure at entrance fees  $\tau_i, \dots, \tau_m$ . The qualities of the services supplied by the clubs may differ and they are inversely related to the usage costs  $c(K_i, W_i)$ , where  $K_i$  is the number of usage acts sold by, and  $W_i$  is the capacity of, club  $i$ . The production cost per unit of capacity is once again  $\rho$ . Let  $P$  be the overall usage price of club services in the sense that it incorporates both the pecuniary entrance fee and the non-pecuniary individual usage cost. In a competitive equilibrium members must be indifferent between all clubs and thus there will be a uniform overall usage price:

$$P \equiv \tau_i + c(K_i, W_i) = \tau_j + c(K_j, W_j) \quad \forall i, j = 1, \dots, m.$$

The (small) individual club  $i$  takes  $P$  as a magnitude given by the market and chooses  $K_i$  and  $\tau_i$  or, equivalently,  $K_i$  and  $W_i$  such that its profit is maximized:

$$\max_{K_i, W_i} [P - c(K_i, W_i)]K_i - \rho W_i.$$

The necessary conditions for an interior optimum are

$$-c_{W_i} K_i = \rho \quad (2.10)$$

and

$$\tau_i = c_{K_i} K_i. \quad (2.11)$$

They correspond to conditions (2.6) and (2.7). The private club also provides a capacity which meets the Samuelson condition and chooses an entrance fee which adequately takes account of the internal congestion costs and the resulting reduction in the quality of its services. Analogously to (2.9), the condition

$$\tau_i \cdot K_i = \rho \cdot W_i + \lambda \cdot c(K_i, W_i) \cdot K_i$$

follows from (2.8), (2.10) and (2.11). It shows that private clubs can operate without loss in a competitive equilibrium when  $\lambda \geq 0$ . If, on the other hand,  $\lambda < 0$ , the competitive process would be ruinous and would not find an equilibrium. If the government limits itself to its

genuine responsibilities and does not take away the legitimate business of the clubs, then it will only step in where clubs would engage in ruinous competition. It follows that the only reasonable assumption for a competition between states is that  $\lambda < 0$ .

**Proposition 2.3:** *The Selection Principle implies that the state limits itself to the provision of those public goods for which  $\lambda < 0$ . An efficient congestion charge for the use of the public infrastructure is therefore not sufficient to finance the cost of providing this infrastructure.*

Whether the state is actually constructed in accordance with the Selection Principle is an empirical question, but the information available about this is less than adequate. According to a study by Borchering and Deacon (1972) city size and expenditure on public goods are proportional, which implies that  $\lambda = 0$ .<sup>8</sup> The authors assume, however, that the quality of the public goods provided is independent of the city size, without giving any statistical information that this is actually true. When, contrary to this assumption, the quality of provision increases with city size, Borchering and Deacon's research implies that  $\lambda$  is negative. A study in which the quality of the public good is measured is that of Brueckner (1981). Brueckner examines the provision with public fire brigades, measuring the quality of the protection they offer in terms of the size of private fire insurance premia, and comes to the unambiguous conclusion that there are economies of scale in the provision of public fire protection ( $\lambda < 0$ ). While this is some indication of economies of scale, it is not compelling evidence, since lower insurance premia in big cities could also have other causes than better fire protection including, for example, a more competitive insurance market. In a review article screening the existing literature, Weichenrieder and Reiter (1997) come to the conclusion that the matter is still undecided.<sup>9</sup>

One problem with the existing literature is that all studies relate to local rather than national public goods, which are the subject of this book. Examples of national public goods are the legal system, defence, highways, and the administrative services of the federal government. The empirical studies at the local level cannot be transferred indiscriminately

<sup>8</sup> See also Blankart (1996, p. 89).

<sup>9</sup> Cf. Holcombe and Sobel (1995) and Walzer (1972).

to these examples because a variant of the Selection Principle may also apply to the allocation of public functions to the different levels of government. If municipalities and provinces have been optimally designed, they will only provide those public goods for which low-scale minima of the user cost functions with regard to the number of usage acts  $K$  and the capacity  $W$  are attainable and they will operate at these minima. At the margin, the average usage cost function  $c(K, W)$  then has a degree of homogeneity equal to zero, and workable governmental competition among provinces or cities is conceivable. However, for the very same reason, public goods with increasing returns to scale will then be assembled at the national level, and the difficulties pointed out above will arise.

It may be that the foundation of a European state will at some stage in history make it possible to apply the Selection Principle to the nation states because they may then have been designed optimally in the sense discussed. However, the current situation in Europe is far removed from that situation. As long as the small European nation states carry out functions which in the United States are considered federal tasks and as long as no superior level of governments exists that could absorb the activities unsuitable for fiscal competition, increasing returns to scale at the margin seem likely, and under that condition it must be expected that fiscal competition will lead to financing deficits.

The result shows that fiscal competition among states has ruinous aspects when (central) governments step in to avoid ruinous competition in the private sector (or among lower levels of government). However, this does not mean that governments go bankrupt, that there is no equilibrium or that the equilibrium is inefficient. In the case considered, it is still in the interest of domestic residents to bear the deficit arising from the accommodation of the mobile factor capital itself.

As capital income is fixed in the rest of the world, the optimization result also implies that the subsidization of mobile capital by means of a labour tax will maximize net-of-tax labour income. Thus, if we distinguished between capital owners and workers, it would even be in the interest of workers to vote for a tax on labour income helping to finance the public infrastructure used by capital alone.

Nevertheless, the fiscal deficit is a problem. In the absence of tax competition, a fiscal tax on capital is feasible (i.e. a tax burden can be imposed on capital which is greater than the cost of the infrastructure it uses and which allows the government to finance its other responsibilities). When there is tax competition, only benefit taxes on capital

are possible. From a distributional perspective this is already a problem. What is worse, however, is that only marginal benefit taxes are possible whose revenue is insufficient to cover the cost of the infrastructure. Capital receives a net subsidy at the expense of immobile taxpayers. Tax competition not only implies a race to the bottom, as is often argued, but in a certain sense it also even implies a race below the bottom. This gives a deeper meaning to the OECD's (1998) fear that the global economy suffers from 'harmful tax competition'.

### TAX HARMONIZATION AND THE OVERPROVISION OF PUBLIC GOODS

To avoid the race below the bottom, compensating policy measures could be sought, both at a national and at an international level. Such measures will be discussed next.

One conceivable measure to avoid the distributional consequences is the international harmonization of capital tax rates at a level above the one resulting from fiscal competition. If capital is taxed excessively, it can escape from one country, but not from all countries. The tax authorities therefore gain more power if they commit themselves to jointly determine their tax rates. By fixing the tax rates above the competitive level, the tax authorities can try to collect more revenue from capital and mitigate the distributional consequences.

The problem with tax harmonization, however, is that it eliminates only one of two competition parameters available to the national government. Despite the fixing of the capital tax rate, labour taxation still leaves the free choice of how much public infrastructure to provide, and it is unclear whether the government will continue to choose an infrastructure  $W$  compatible with the Samuelson condition.

To see how the rent of the domestic population reacts to an increase in the provision of public infrastructure, given the capital tax rate, differentiate equation (2.4):

$$\left. \frac{dR}{dW} \right|_{\tau=\text{const.}} = (f_K - r - c_K \cdot K - c) \cdot \Phi - c_W \cdot K - \rho. \quad (2.12)$$

Here  $\Phi$  is the reaction coefficient for capital which results from implicitly differentiating the arbitrage condition (2.1) with given  $\tau$ ,

$$\Phi \equiv \left. \frac{dK}{dW} \right|_{\tau=\text{const.}} = \frac{c_W}{f_{KK} - c_K} > 0. \quad (2.13)$$

It is obvious that this coefficient is always strictly positive: an improvement in the infrastructure with a given capital tax rate attracts more capital into the country. Using equation (2.1), it follows from (2.12) that

$$\left. \frac{dR}{dW} \right|_{\tau=\text{const.}} = (\tau - c_K \cdot K) \cdot \Phi - c_W \cdot K - \rho. \quad (2.14)$$

In the national optimum,  $dR/dW = 0$  and hence

$$(\tau - c_K \cdot K) \cdot \Phi = \rho + c_W \cdot K \quad (2.15)$$

is the optimality condition. In the unconstrained optimum discussed previously, it follows from (2.7) that  $\tau - c_K \cdot K = 0$  and from (2.6) that  $\rho + c_W \cdot K = 0$ . Thus, of course, condition (2.15) would automatically hold if the harmonization constraint on the national tax rate were not binding.

With an effective constraint, however, which forces  $\tau$  to obtain a value above the marginal congestion externality  $c_K \cdot K$ , the left-hand side of the expression is strictly positive, and so the right-hand side must be positive, too. The marginal willingness to pay, summed over all usage acts, is less than the cost of providing the public infrastructure,

$$-c_W(K, W) \cdot K < \rho, \quad (2.16)$$

indicating an oversupply of the infrastructure as measured by the Samuelson rule. Given that capital is deterred by a tax rate higher than necessary to cover the marginal congestion externality, it pays domestic residents to lure more of it into the country by offering a better infrastructure.

Equation (2.16) describes one country's reaction to an exogenous constraint on the domestic source tax rate, given the world market rate of interest. If this country were the only one to face such a constraint, its capital stock would shrink and (2.16) might be satisfied even at a level of  $W$  which is equal to the unconstrained optimum.

There would be an oversupply of infrastructure relative to a constrained optimum in which the stock of capital is too small, but not necessarily relative to the laissez faire optimum. However, in fact, all countries face the same constraint. Thus the world market rate of interest has to adjust so as to satisfy equation (2.1), and in a symmetrical equilibrium with a given world stock of capital the same amount of capital will be working in each single country as in the absence of constraints. Expression (2.16) therefore not only implies that the Samuelson rule is violated, but also that more infrastructure is provided than in a laissez faire equilibrium where  $\tau$  and  $W$  are both chosen competitively.<sup>10</sup>

**Proposition 2.4:** *Tax harmonization intensifies infrastructure competition and leads to an overprovision of the public infrastructure in equilibrium.*

This result is undesirable not only from an efficiency but also from a distributional perspective. At least part of the extra tax revenue resulting from a harmonized tax rate increase will dissipate by financing the excessive amount of infrastructure at the expense of the fixed factor. To avoid this consequence, harmonizing the supply of infrastructure goods between the countries in addition to harmonizing the tax rates could be considered as a policy measure. This is only a theoretical possibility, however. Given that the infrastructure needs and preferences of the different countries are as different as they are, a useful harmonization of infrastructure expenditures is hard to imagine in practice.

## SELF-FINANCING CONSTRAINTS AND AVERAGE COST PRICING

As was shown, tax harmonization is a problematic means to avoid the distributional consequences of unbridled tax competition. It induces countries to engage in excessive infrastructure competition which

<sup>10</sup> Fuest (1995) offers a useful approach with tax and infrastructure competition where capital and infrastructure inputs are mobile across the borders. He finds that tax harmonization may lower social welfare if infrastructure competition continues. However, in his model there is no overprovision of public infrastructure.

counters the distributional goal and leads to an inefficiently large provision of infrastructure. An alternative examined in this section is the imposition of a self-financing constraint on capital. Suppose instead of harmonizing the tax rates, the states agree not to subsidize capital and to finance the infrastructure investment exclusively with capital charges, leaving the immobile factors tax free (or charging them only with taxes for the public goods they need themselves). Otherwise, the states retain their rights to choose the policies they want. By definition, this policy prevents labour from subsidizing capital, and perhaps it is also a useful corrective device that avoids or mitigates the overprovision of infrastructure goods.

To find the answer, eliminate the labour tax in the government budget constraint (2.2),  $\omega = 0$ , so that this constraint becomes a self-financing constraint:

$$\rho W = \tau K. \quad (2.17)$$

As before, the single competitive government seeks to maximize the sum of all national rents. Differentiating equation (2.3), given the labour tax  $\omega$ , yields the following first-order condition for a national maximum:

$$\left. \frac{dR}{d\tau} \right|_{\tau K = \rho W} = -\varphi \cdot f_{KK} \cdot K = 0. \quad (2.18)$$

Here

$$\varphi \equiv \left. \frac{dK}{d\tau} \right|_{\tau K = \rho W} = \frac{1 + c_W \frac{K}{\rho}}{f_{KK} - c_K - c_W \frac{\tau}{\rho}} \quad (2.19)$$

is a differential quotient for the response of capital to a marginal increase in the tax rate under the condition of self-financing which follows from equations (2.1) and (2.17). The differential quotient combines the deterrent effect of the tax, one divided by the denominator, and the attraction effect of the public infrastructure, the second item of the numerator divided by the denominator. The denominator is negative if, as is assumed, the second-order condition of the government's

optimization problem is met.<sup>11</sup> As  $f_{KK} < 0$ , this ensures that the sign of  $dR/d\tau$  is simply the negative of the sign of the numerator of (2.19). In the optimum, the numerator of (2.19) has to be zero, so as to satisfy (2.18). It follows that the condition for an optimal provision of infrastructure with a self-financing constraint is given by the equation

$$\rho = -c_W(K, W) \cdot K.$$

As this is the Samuelson condition (2.6), the initial suspicion is confirmed. Indeed, a self-financing constraint will do the job and induce the competitive government to provide an efficient amount of infrastructure.

As the self-financing constraint excludes any subsidies paid by the immobile factor, it is also clear that the income of this factor, and hence also the total sum of rents, is maximized when the tax-infrastructure combination is chosen which meets the Samuelson condition and maximizes the country's capital import.

To interpret the result, suppose the tax rate is gradually raised, starting from zero. Initially,  $\rho < -c_W K$ , and hence the numerator of (2.19) is negative such that (2.19) itself is positive and, from (2.18),  $dR/d\tau > 0$ . The attraction effect of the infrastructure which can be financed with the additional tax revenue outweighs the deterrent effect of the tax. However, the higher the tax rate already is, the smaller is the overweight. In the optimum the two effects are balanced at the margin and this is precisely the point where the supply of public goods meets the Samuelson condition.

Since the Samuelson condition still holds true despite the self-financing constraint, the budget deficit must be avoided through an infringement of the condition for an optimal congestion charge. In fact, taking account of (2.6), (2.8) and the self-financing constraint (2.17), one can derive an expression for the optimal tax rate,

$$\tau = c_K \cdot K - \lambda c,$$

<sup>11</sup> The second-order condition is  $d^2R/d\tau^2 < 0$  or, which comes to the same thing,  $d\varphi/d\tau = d^2K/d\tau^2 < 0$ . Since  $W = \tau K/\rho$ , this condition becomes  $d\varphi/d\tau = c_{WW} \cdot (K/\rho)^2/D < 0$ , where  $D$  is the denominator of the expression on the right-hand side of (2.19):  $D = f_{KK} - c_K - c_W \tau/\rho$ . Since  $c_{WW} > 0$ , the second-order condition is met when  $D < 0$ , which in turn requires  $f_{KK} - c_K < c_W \tau/\rho$ . Since  $f_{KK} < 0$  and  $c_K > 0$ ,  $c_W \tau/\rho$  can thus not be too strongly negative. It is assumed that this is the case.

which, when  $\lambda \neq 0$ , is not compatible with a congestion cost charge that covers the marginal crowding externality (see (2.7)). In the relevant case where  $\lambda < 0$ , the tax rate is greater than the marginal crowding externality  $c_K \cdot K$ .

If only one country imposed the self-financing constraint and the world market rate of interest could therefore be taken as given, less capital would be invested than in the first best optimum and, with the smaller amount of capital employed, the sum of the marginal willingness to pay,  $-c_W K$ , would be smaller. Accordingly, the Samuelson rule (2.6) would imply a smaller optimal capacity  $W$  of the infrastructure, too. However, once again, this is not what was assumed. If all countries are identical and all face the same self-financing constraint then the amount of capital employed in each country must be the same as is the case where there is no self-financing constraint. Hence the world market rate of return will have to fall so as to satisfy equation (2.1) despite the higher tax rate on capital. In this case not only the Samuelson condition holds, but in addition the amount of infrastructure it implies is the same as without the self-financing constraint.

Given that the same infrastructure capacity and the same amount of capital are available, but self-financing is required, it is clear that gross wage income is the same and net-of-tax wage income is higher than in the case without any constraints. The distributional goal aimed at with the self-financing constraint is achieved.

**Proposition 2.5:** *Suppose that all countries agree to respect a self-financing constraint which obligates them to charge capital with the full cost of the infrastructure it uses despite economies of scale in infrastructure investment. Then the single competitive country will provide an efficient amount of infrastructure satisfying the Samuelson rule, and in a symmetrical equilibrium it will even provide the same amount as in a first best optimum. The imposition of a self-financing constraint increases the net-of-tax wage income at the expense of capital income.*

This result suggests that average cost pricing for public infrastructure may be a more useful rule for the EU countries than was previously thought. In its 1998 White Paper, 'Fair Payment for Infrastructure Use', which concentrated on road and railway issues, the European Commission argued that public infrastructure needs marginal cost pricing, and it pointed out that crowding or congestion externalities are

the dominant component of the marginal cost to be considered in this context. This view is well founded, as the laissez faire version of the above model has shown, but it should be clear now that when the Selection Principle holds and increasing returns to scale are the normal case for state-run operations, marginal cost pricing implies prices below the average cost of the infrastructure that need to be accompanied by a public subsidy from other sources. If distributional goals matter in addition to efficiency considerations in the EU – and they certainly do – then average cost pricing and the exclusion of subsidies can also be legitimated. When constraints force countries to use average cost prices, they can keep full autonomy concerning their infrastructure decisions and will make the right allocative decisions without incurring income losses for the fixed factors.

This demonstrates the point made in the introductory chapter that it would be a mistake to conclude from a failure in systems competition that a centralized solution must necessarily be sought. Sometimes it is possible to establish rules of conduct for the competing countries which make systems competition workable.

The legal implementation of average cost pricing could be facilitated by extending the existing prohibition on subsidies.<sup>12</sup> According to the present EU rules, the individual countries are forbidden to subsidize firms directly, and it is one of the most visible, and by now accepted, limitations of a country's sovereignty when the European Commission prohibits a national subsidy, as it frequently does. If this prohibition is extended to cover indirect subsidies through reducing the price of using the public infrastructure below the average cost of providing it, then the undesirable distributional implications of the unconstrained competitive equilibrium can be avoided.

## A CRITIQUE OF THE UNDERPROVISION HYPOTHESIS

The optimism about the efficiency of the supply of public goods in systems competition that emerges from proposition 2.5 contrasts sharply with the underprovision hypothesis of Zodrow and Mieszkowski (1986) and Wilson (1986), which is one of the most frequently cited results

<sup>12</sup> See Article 92 of the Treaty Establishing the European Community.

in the tax competition literature.<sup>13</sup> The point this literature makes is that capital mobility increases the supply elasticity of the taxable factors, thereby raises the marginal cost of public funds, and hence reduces the optimal supply of public goods.

In its basic version the argument was derived by assuming that only a source tax on capital is available to finance a public consumption good and that the fixed factor cannot be taxed. If the fixed factor can be taxed, the cost of a euro of public funds is one euro, because there is no excess burden from taxation. Thus the optimal supply of public consumption goods is determined by the Samuelson rule according to which the sum of all consumers' marginal willingness to pay equals the marginal cost of providing the public good. If, however, only mobile capital can be taxed, the cost of raising one euro of public funds is above one euro, because the excess burden comes in addition to the mere financing cost, and accordingly fewer public goods are supplied than implied by the Samuelson rule.

This can easily be understood by once again looking at figure 2.1 which showed that labour bears more than the full burden of a source tax on capital. In order to raise the source tax revenue  $\tau \cdot K$ , or BCFE, while keeping capital's net rate of return at par with the given world level, capital must be exported so as to raise its pre-tax rate of return at home. Labour, which is the complementary factor of production, will then experience a lower marginal product and receive a lower income. However, labour income falls not only by the tax revenue imposed on capital. In addition it falls by the amount  $-\tau \cdot \Delta K/2$  or CGF where  $\Delta K$  is the capital export. Thus, the cost of public funds exceeds the revenue raised by this extra decline in labour income, and the underprovision result follows.

The Zodrow-Mieszkowski-Wilson approach has a certain formal similarity with the self-financing constraint introduced in the previous section in lieu of tax harmonization. Why is it that the approach of the previous section implied an efficient provision of public goods while the Zodrow-Mieszkowski-Wilson approach implies an underprovision?

The basic reason lies in the fact that the latter refers to public consumption goods rather than intermediate goods which would benefit private firms, and that countries do not compete in public consumption goods. While public consumption goods do not benefit the factor capital, the taxes needed to finance them are assumed to be imposed

<sup>13</sup> See also Oates (1972) and Wilson (1999).

on this factor. This asymmetry makes financing and providing public consumption goods a difficult matter, with a substantial excess burden of taxation being involved. By contrast, public intermediate goods by themselves attract capital. This makes financing and providing the goods easy, and on balance no excess burden occurs. Taxing capital to finance public consumption goods results in underprovision, but taxing capital to finance public intermediate goods results in an efficient provision.

This emphasizes once again the importance of distributional issues. As public consumption goods benefit primarily the recipients of labour income, the imposition of a capital tax for the purpose of financing these goods is a measure which can be justified with a distributional objective in mind. In a sense, therefore, the lesson of the underprovision literature is that the attempt to redistribute from capital to labour is costly and futile if capital is mobile. This is similar to the basic message derived by MacDougall (1960) and Richman (1963), the only difference being that now redistribution in kind instead of a money transfer is considered.

As a counter argument against the view that it is the distinction between public consumption and intermediate goods that matters it could be pointed out that Zodrow and Mieszkowski did not limit their approach to public consumption goods but also extended it to the case of public intermediate goods (1986, pp. 362–6). Did they not show that these goods will also be underprovided in fiscal competition? They did not. Unfortunately, this part of their analysis suffers from a formal mistake that drives their results. The authors *assume* that an increase in the tax rate, despite the improvement in the infrastructure associated with it, has, on balance, a negative effect on the amount of capital employed, without recognizing that such a negative effect is an indication of a too high tax rate and an overprovision of infrastructure. In fact, they derive the alleged underprovision from the implicit assumption of an overprovision of infrastructure. The Zodrow-Mieszkowski model is presented in the appendix to this chapter where the mistake in their reasoning is explained in detail.

## RESIDENCE TAXES

Let us return to the question of how the distributional consequences of systems competition, in particular the need to subsidize capital, can

be avoided. Are there measures which, unlike the collective imposition of self-financing constraints, can be carried out by a single country alone without finding the consent of others?

One possibility, recommended by Bucovetsky and Wilson (1991), is replacing the principle of taxing at source with the residence tax principle. When the revenue that domestic capital owners earn in foreign countries can be taxed by the domestic authorities, the evasive reaction of transferring the investment location is no longer possible. In the model this means that  $rK$  will become the tax base and the capital income tax will become a lump sum tax.<sup>14</sup>

In principle the residence principle can be adopted unilaterally, without other countries following or using the same rule. A country that taxes the income of its own residents regardless of where it is earned and leaves the income of foreigners untaxed does not have to fear the kind of tax evasion studied in the previous sections. However, in practice, the residence principle can hardly be implemented without the help of other countries. Thus, in 1977 the OECD countries agreed on a Model Double Taxation Convention, in which the residence principle was foreseen for the taxation of interest income.<sup>15</sup> This agreement has had limited relevance in practice, though, because countries did not assist one another in collecting the revenue, and tax evasion has become a common practice. To fight tax evasion the EU is currently seeking an additional agreement between its member countries to either impose a uniform source tax on interest income or to mutually inform the residence countries about the interest incomes earned on their bank accounts by foreign residents. It remains to be seen how successful this approach will be.

It should be noted that the OECD Model Double Taxation Convention and the EU rules discussed only refer to interest income and do not incorporate business profits. Distributed earnings are taxed according to bilateral double taxation agreements and usually incorporate both residence and source tax elements. Retained earnings are nearly always taxed by the source country alone.<sup>16</sup> It will be a long struggle to introduce the residence principle for business profits, if it ever happens.

<sup>14</sup> In an intertemporal allocation model there is, of course, the opportunity of taking evasive action in the form of reducing savings. See Sinn (1985, chapters 7 and 9).

<sup>15</sup> See OECD (1977).

<sup>16</sup> Cf. Sinn (1985, chapter 7) and Weichenrieder (1995).

Even if the political impediments on the way towards residence taxation could one day be overcome, this principle is not really a safeguard against ruinous tax competition since investors could change their residence instead of the location of their investment. In the EU in particular, this possibility is gaining importance since the freedom of establishment has been granted to all citizens. Emigrating to other countries has become easy. By the arguments given above, tax competition in such a situation will lead to an equilibrium where the tax rates are driven down to the marginal cost of providing a formal residence in a country, and this may not be very much. After all, the marginal cost of hosting a mail box company is close to zero.

## DIVIDEND TAXES AND EQUITY TRAPS

An alternative, unilaterally available taxation approach for preventing the evasive response of capital would be to shift the tax system from income taxation toward cash flow taxation, as was recommended by the Meade Committee (1978).<sup>17</sup> Cash flow taxes are taxes which are periodically raised on the real and/or financial surplus of firms. As they allow an immediate write-off of real and/or financial investment projects, they effectively leave marginal new investment projects, whose capital value is zero, tax free. They nevertheless generate a tax revenue since they effectively tax the returns from previous investment, carried out before the cash flow taxes were introduced. Although old projects die out, repeated replacement investments ensure that the cash flow tax generates a permanent and ever growing tax revenue whose present value equals the product of the tax rate and the historical stock of capital existing at the time of tax reform.

Cash flow taxes are powerful revenue raisers that cannot be competed away in tax competition. The tax on marginal investment cannot be eroded by tax competition because there is no such tax, and the tax on the returns of existing capital cannot erode because a country can neither hope to attract capital by cutting the tax rate nor does it have to fear a capital flight by raising it. A flight of capital means that investors do not reinvest but use the funds freed through

<sup>17</sup> See Sinn (1985, chapter 11) for an extensive discussion of the theoretical underpinnings.

depreciation for foreign investment. Given that gross investment can immediately be written off under the cash flow tax, the lack of reinvestment increases the tax base and the tax liability. The cash flow tax thus incorporates an exit fee that compensates the state for the foregone tax on the future cash flow that would have been collected had capital stayed in the country.

While the chances for cash flow taxes being implemented in the foreseeable future are small, it is important to realize that the existing taxes on corporate distributions come close to such taxes. In fact, the so-called S-based tax of the Meade Committee, which is a tax on the real and financial cash flow of a firm, is a dividend tax.<sup>18</sup> The S-based tax differs from a dividend tax only in that it involves a subsidy on new share issues (negative dividends) at the rate of the dividend tax. The existing dividend taxes, which do not have this feature, discriminate against equity creation in the form of issuing new shares but are neutral with regard to equity creation through profit retentions and hence do not increase the cost of capital when firms react flexibly and finance new investment entirely with retained earnings.<sup>19</sup> They leave marginal investment financed with retained earnings tax free, since the tax on future dividends earned by this investment is outweighed by the dividend tax saved by deciding to retain and invest rather than distribute the earnings. A country does not have to fear that it will drive out existing capital if it raises the dividend tax rate. A dividend tax punishes capital flight in a similar way as a tax on real cash flow does, because a termination of reinvestment within the firm means that more dividends are distributed and more dividend taxes are paid.<sup>20</sup> Capital is trapped in the corporate firm and cannot escape without paying a toll to the government. By contrast, taxes on retained earnings increase the cost of capital and drive capital out of the country.

<sup>18</sup> The financial cash flow is net borrowing minus net interest payments, and the real cash flow is sales revenue minus wage costs, minus the costs of intermediate products and minus gross investment. The sum of the real and financial cash flow is the cash flow accruing to the firm's shareholders, i.e. dividends net of new share issues.

<sup>19</sup> See Sinn (1985, chapters 4, 5 and 7) and Sinn (1991b).

<sup>20</sup> However, the dividend tax punishes only the withdrawal of previous retentions. When previous retentions are used up, a withdrawal of the capital stemming from new issues is possible without incurring a tax liability.

It follows that tax competition will reduce the taxes on retained earnings but not the dividend taxes.<sup>21</sup> If anything, there is the risk that countries use dividend taxes to exploit foreign shareholders after the investment is made and choose excessively high tax rates. This may explain why the international double taxation agreements between countries refer to the taxes on distributed rather than retained earnings and why they specify upper rather than lower limits on the tax rates. The observation may also explain, for example, why Germany's tax reform in 2000, which certainly was carried out with an eye on international tax competition, involved a substantial cut in the taxes on retained earnings while dividend taxes were tacitly increased by moving from the previous full-imputation to a partial imputation system with a double taxation of dividends at the level of firms and shareholder households.

This observation partially alleviates the fear that tax competition will benefit capital and hurt immobile labour. Capital caught in the corporate equity trap may also be a victim of tax competition. If all capital owners had the same diversified portfolio of assets and hence shared equally in the losses resulting from high dividend taxes, this could be welcomed as a mitigating distributional effect which reduces the adverse effects on the net-of-tax income of immobile labour. However, this is certainly not the case. Owners of financial assets would benefit from the higher interest rates resulting from the dissipation of taxes on retained earnings and so would new purchasers of shares who come in after the forces of tax competition have become operative: share prices would adjust such that their net rate of return on shares would be the same as the net-of-tax rate of return in financial assets. Moreover, of course, owners of non-corporate capital would also not be hurt by an increase in dividend taxes. Existing owners of corporate shares, on the other hand, would have to bear the increased dividend taxes alone since the additional future dividend taxes would be capitalized in the share prices prevailing at present.

<sup>21</sup> Dividend taxes can be interpreted as taxes on quasi-rents. Thus, the result explained in the text has a certain resemblance with the finding of Huizinga and Nielsen (1997) that tax competition does not eliminate taxes on pure profits if some of these profits accrue to foreigners. However, the argument developed above holds true even when, unlike the Huizinga-Nielsen model, there are not rents flowing to foreigners, say, because the production function is linear homogeneous and fixed factors are exclusively owned by domestic residents.

Apart from problematic redistribution effects among the group of capital owners, the empirical importance for Europe of the upward forces on dividend taxes should not be overestimated, though. First, corporations, which are subjected to dividend taxes, play only a limited role on this continent. In Germany, for example, joint stock companies do not represent more than 20% of overall business revenues. Second, the theoretical point made above would only be valid empirically if marginal corporate investment could be entirely financed with retained earnings. While this used to be a valid approximation for long periods of time, the many start-ups characterizing the New Economy have made new issues of shares an increasingly important marginal source of finance. New firms have to rely on new share issues and, in a dynamic context, dividend taxes raise the cost of capital for such share issues much more than was previously thought (Sinn 1991a, 1993). Thus, a competitive country does, in fact, have a lot to gain if it reduces the tax on corporate distributions, and the difference among the erosive forces working on new share issues and retained earnings may, after all, not be all that large.

## EXISTENCE PROBLEMS

As was shown, the real problem of systems competition is not the underprovision of public goods but rather its distributional implications. Judged against the current tax systems where capital contributes towards financing the general budget, it is a disturbing aspect that uncontrolled tax competition results in labour partially subsidizing the infrastructure used by capital. This is not quite what one can call ruinous tax competition, but it comes close to it.

Private competition is called ruinous if, because of increasing returns to scale, competitive prices do not cover costs and firms try to reach a profitable situation by expanding excessively, so that in the end most firms go bankrupt and a non-competitive situation with one or a few surviving firms emerges. Modelling what goes on in ruinous competition is difficult, but to show that it will emerge is easy, because it is sufficient to demonstrate that due to scale economies a competitive equilibrium fails to exist. This section considers the possibility of truly ruinous systems competition to clarify the issue from a theoretical perspective and to identify the necessary assumptions without necessarily claiming that the world we live in will, in the foreseeable future, come close to this possibility.

In the model set up, only one new assumption has to be introduced: the international mobility of labour in addition to that of capital. When only one factor was mobile, increasing returns to scale in the production and provision of the public infrastructure was not a fundamental problem for competition because the immobility of the other factor prevented the individual countries from being able to exploit the scale economies at the cost of their competitors. The situation looks very different when labour is also mobile.

## A non-existence proof

To show that there is an existence problem for a competitive equilibrium when all factors are mobile, a proof by contradiction will be undertaken. Suppose that there is an equilibrium in which the net-of-tax wage rate in the country considered is equal to the corresponding wage rate in the international labour market. The values  $w^*$ ,  $K^*$ ,  $L^*$  and  $W^*$  indicate the equilibrium values of the net-of-tax wage rate, the capital stock, employment, and the capacity of the public infrastructure, respectively. The income of the resident population, which consists of capital and wage income, is

$$R^* = r\bar{K} + w^*L^*. \quad (2.20)$$

Since capital income is fixed by the conditions in the world market we only need to consider wages. Solving for  $w^*$  and using (2.4) gives the expression

$$w^* = [f(K^*, L^*) - rK^* - c(K^*, W^*)K^* - \rho W^*]/L^*$$

for the net-of-tax wage rate. If an equilibrium would exist, then, with the given world market conditions, the single government would be unable to increase the income of the existing population  $L^*$  through its own actions. In fact, however, it can easily be shown that this is always possible when the government takes action to make the economy grow larger. For example, the government can increase  $W$  to  $\alpha W^*$ , allow immigration until employment reaches  $\alpha L^*$ , and, taking account of (2.1), choose a tax rate  $\tau$  which ensures that  $K = \alpha K^*$  when  $L = \alpha L^*$ , where  $\alpha$  is a parameter larger than one. Because of the homogeneity assumptions, which apply to  $f(K, L)$  and  $c(K, W)$  with  $\lambda < 0$ , the net-of-tax wage rate increases to

$$w = [f(\alpha K^*, \alpha L^*) - r\alpha K^* - c(\alpha K^*, \alpha W^*)\alpha K^* - \rho\alpha W^*]/(\alpha L^*)$$

$$= [f(K^*, L^*) - rK^* - \alpha^\lambda c(K^*, W^*)K^* - \rho W^*]/L^* > w^*$$

where  $f_{LL} < 0$  implies immigration up to the limit  $\alpha L^*$ . The income of the existing population rises correspondingly to

$$R = r \cdot \bar{K} + w \cdot L^* > R^* = r \cdot \bar{K} + w^* L^*.$$

This contradicts the assumption that  $w^*$ ,  $K^*$ ,  $L^*$  and  $W^*$  represent an equilibrium and proves the following proposition.

**Proposition 2.6:** *If all factors of production are mobile, the production function  $f(K, L)$  is linearly homogeneous, and the Selection Principle is operative in the sense of concentrating activities with increasing returns to scale in the government sector, there is no equilibrium in infrastructure competition.*

### *Why the Selection Principle implies non-existence*

This result is a logical implication of a very abstract model and caution is required in transferring it to the real world. The assumption that all factors of production are perfectly mobile is an idealization that may well be considered exaggerated given the language barriers that still exist in the European Union. However, it should be taken into account that it depends not so much on the mobility of the existing EU population as on the differential mobility among the EU countries of those people who have already decided to immigrate from third countries. This has already been pointed out in the introductory chapter. Increasing returns to scale in the provision of public infrastructure concentrates the flow of migrants only into a few countries and increases the imbalances in country size that already exist now. For Germany, which, even relative to its size, absorbed the lion's share of European immigrants in recent years, proposition 2.6 is more than a theoretical possibility conceived in an ivory tower. Perhaps it is the non-existence of an immigration equilibrium which provides the material for the distressing sensational reports which the television channels broadcast all over the world. From the fall of the Iron Curtain up to the end of 1997, on balance, around five million people streamed into

western Europe, more than three million of them to Germany alone. At the time of writing, the foreign-born percentage of the population in Germany is about as high as the respective percentage in the US, the classical immigration country. And this does not include the internal east-west German migration, which was a net 1.3 million people for western Germany within a decade after the Wall had come down. In view of these figures, the destabilizing power of systems competition should not be underestimated.

From a theoretical point of view, the result could be criticized because it abstracts from land as a factor of production, which is, of course, not mobile. If land is important for production, the economy as a whole may not exhibit scale economies with regard to the mobile factors even if the government sector itself operates under increasing returns to scale. However, land is no longer an important factor of production in a modern industrial society. Less than 3% of the workforce in Germany now works in agriculture, and the returns to land from all economic uses may be in the order of magnitude of not more than 4 to 5% of the German national product.<sup>22</sup>

If land can be neglected, the production of goods and services in the public and private sectors can really only have constant or increasing returns to scale. Constant returns to scale show up when, as is always possible, larger scale production processes can be realized through replication of the processes already available at a lower level, and there are increasing returns to scale when indivisibilities in production mean that there are additional efficient production possibilities at higher levels of scale which were not available at lower levels. In general, we should assume that both types of production processes exist. If the two types were spread uniformly over the private and public sectors, then competitive market economies could not exist because the private sector would exhibit increasing returns to scale. However, if the Selection Principle is operative, production is organized so that the private sector takes over the production processes with constant returns to scale and the public sector takes over the remaining ones with increasing returns to scale, and both sectors coexist. A fundamental problem

<sup>22</sup> In Sinn and Sinn (1991, appendix II) the value of land in west Germany is calculated for the year 1989. If a yield of 4% is assumed, which is the average obtained for residential property in Germany, the share of the returns from land in GDP is around 3.7%. Based on a study by Bach and Bartholmai (1998) a value of 5.1% is obtained. I have Marcel Thum to thank for these calculations.

arises, however, if, in addition to market competition, systems competition is introduced, because then the exceptions from the market process which the government had administered are forced back into a competitive environment. The ruinous consequences which prevented a competitive solution in the first place reappear on the higher level of systems competition.

## POLICY IMPLICATIONS

What can be learnt from the analysis of this section for the construction of a new Europe without internal borders? Much depends on the development of labour mobility. If labour mobility stays limited for the time being, systems competition in terms of taxes and infrastructure levels can be expected to work in the sense that an efficient equilibrium among the countries will be found. However, efficiency is not equity. Capital, except possibly for corporate capital trapped by dividend taxes, will be the big winner of systems competition. It no longer has to contribute towards financing the general government budget, and, what is more, it will even enjoy subsidies in the sense that its taxes have to cover only part of the public infrastructure it uses.

It is not a good idea to harmonize tax rates to prevent the distributional consequences, because that would only trigger off an even more intense competition for mobile capital with public infrastructure expenses. If harmonization imposes an effective constraint on tax rates, an overprovision of infrastructure results.

To avoid this consequence, a European agreement to impose self-financing constraints in the form of an extended subsidy prohibition or the requirement to use average cost pricing for public facilities would be useful. A self-financing constraint leads to efficient provision of public goods in systems competition without burdening labour with a tax to subsidize capital. Net-of-tax labour incomes would be higher, and profit incomes lower.

If labour income, too, becomes more flexible, then an equilibrium in systems competition may no longer exist. Instead, scale economies would tend to concentrate the population in large countries at the expense of the smaller ones. Systems competition would be ruinous, since it includes activities which the state originally absorbed to avoid ruinous competition.

Before this happens it may be better to think about creating a new layer of government in Europe whose function would be to provide

those public services which exhibit pronounced supra-national scale economies. Defence, money supply and constitutional jurisdiction are among the first functions that can be shifted to a central government.

Of course, there is the danger of a misuse of tax money by a central government that operates at a distance from its voters. That such a danger cannot be dismissed out of hand is shown by the incident concerning the Brussels Perry Lux Agency, which in 1998 resulted in the European Parliament refusing to exonerate the European Commission. However, as was said before, it makes no sense to judge the political bodies to be created with the nirvana approach of first best policy decisions. European history is full of examples of successful unification and centralization, a process which Popitz (1927) even saw as a historical law. Professional economists, too, should give some sympathetic, though also critical, attention to the peaceful process of European political integration, which has only just begun.

## Appendix to Chapter 2 Criticism of the Zodrow and Mieszkowski Infrastructure Model

Zodrow and Mieszkowski (1986) first show that public consumption goods are underprovided in equilibrium if these goods must be financed with a tax on mobile capital and they then extend their argument to the case of public infrastructure or investment goods. This appendix shows why this extension is flawed.<sup>23</sup>

The authors assume that output is produced according to a production function  $F(K, W)$ ,  $F_{KW} > 0$ ,  $F_W > 0$ ,  $F_{WW} < 0$ , where the arguments are capital  $K$  and the capacity of infrastructure  $W$ ,<sup>24</sup> and they postulate analogously to (2.1) and (2.2) (for  $\omega = 0$ )

$$F_K(K, W) = r + \tau \quad (\text{A2.1})$$

and

$$W = \tau K, \quad (\text{A2.2})$$

<sup>23</sup> An alternative criticism of the Zodrow-Mieszkowski argument can be found in Noiset (1995). See also Sinn (1997).

<sup>24</sup> The symbols are changed here in order to make the coverage as far as possible the same as that in the model used in this paper.

where the price  $p$  of the infrastructure is equal to one and crowding externalities are assumed away.<sup>25</sup>

Analogously to (2.18) they calculate from (A2.1) and (A2.2) a differential quotient

$$\varphi \equiv \frac{dK}{d\tau} \Big|_{(A2.1), (A2.2)} = \frac{1 - KF_{KW}}{F_{KK} + \tau F_{KB}}, \quad (A2.3)$$

which measures the net effect on the amount of capital employed of a tax rate increase and the improvement in the infrastructure that this increase makes possible. They also assume that the denominator of the right-hand side of (A2.3) is negative but they assume in addition that the numerator is positive,

$$K \cdot F_{KW} < 1, \quad (A2.4)$$

i.e. that a tax increase will deter capital despite the improvement of the infrastructure which this tax increase makes possible. They base this assumption on the statement, which is not explained further, that this is a 'stability assumption' (ibid., p. 363). 'We assume that the model is stable in the sense that the marginal cost of diverting a unit of output to public services for firms (which is equal to unity) is greater than the associated increase in output due to the increased marginal productivity of capital ( $K \cdot F_{KW}$ ).' The authors then show that assumption (A2.4) implies an underprovision of infrastructure goods if the tax rate is chosen such that the income of the fixed factor is maximized:

$$F_W > 1. \quad (A2.5)$$

Unfortunately, the reasoning is contradictory. It cannot in any case be applied to all the production functions that the authors allow for. An

<sup>25</sup> To see that the Zodrow-Mieszkowski model is incompatible with crowding externalities assume that  $F(K, W) = f(K, L) - c(K, W) \cdot K$  as in this model. Equation (A2.1) then becomes  $f_K(K, L) - c(K, W) - c_K(K, W) \cdot K = r + \tau$  rather than  $f_K(K, L) - c(K, W) = r + \tau$  according to equation (2.1). The comparison shows that the authors implicitly assume pure public goods or private infrastructure goods for which the congestion externality  $c_K(K, W) \cdot K$  is not an externality at all, but rather a productivity effect taken fully into account by the individual investor. This difference is important but it is not the decisive criticism of the derivation of the underprovision hypothesis.

example can explain this. Suppose that  $F_{KWK} = F_W(0, W) = 0$  which, of course, does not have to hold in general, but is perfectly in line with what the authors assume. Then

$$K \cdot F_{KW}(K, W) = \int_0^K F_{KW}(u, W) du = F_W(K, W),$$

and equation (A2.4) becomes

$$F_W < 1,$$

which indicates an overprovision of infrastructure goods. This obviously contradicts (A2.5). Apparently the authors assume overprovision of infrastructure goods in order to prove that there is underprovision.

This does not mean that there are no production functions for which (A2.4) and (A2.5) are compatible with one another, but it is quite inadmissible to use assumption (A2.4) to prove that the public goods are underprovided. This assumption lacks an economic basis and is too close to the condition for an overprovision for it to be able to serve as the basis for the underprovision hypothesis.

## The Erosion of the Welfare State

### GLOBALIZATION AND THE WELFARE STATE

Globalization means gains from trade. The international distribution of labour continually improves and permits each country to display its own strengths. A country produces those goods in which it has comparative advantage and purchases all others. This way, every country gains regardless of whether it is poor or rich.

Thus far the globalization of the world economy has been a success story. It has increased people's welfare and has helped prevent wars over scarce resources. Trade has rewarded the economic endeavours of the countries without causing disadvantages elsewhere.

The people in the Third World who live from their labour income benefit especially from globalization, because globalization means trade, and trade tends to equalize factor prices between the participating countries. Labour demand and wages increase in the labour-abundant and capital-scarce countries because these countries can specialize in the production of labour-intensive goods and because they attract direct investment and loan capital which helps finance domestic investment. The mobility of people also contributes to the factor price equalization because people emigrate from countries where labour is abundant to countries where it is scarce. There is no better way of providing development aid and no better international welfare policy than securing the economic freedom to move and promoting free trade.

Unfortunately, however, trade and migration also create losers. These include, in particular, those workers in the highly developed countries whose jobs can be done at lower wages in other parts of the world. It is true that most of these workers are suppliers of unskilled labour; however, the industrial workers who form the core of the labour supply in the developed countries may also be affected. It is certainly possible that the whole wage scale in the developed countries will start to slide downwards as a result of globalization. This does not mean that wages will fall in absolute terms, but it seems likely that the growth rate of wages in the developed countries will be smaller than it would have been without globalization and that poverty will show up at the margins of society.

The tendency towards the equalization of factor prices, which is inherent in trade, makes the income distribution in the rich countries more unequal and thus increases the need for welfare assistance. The welfare state is needed to cushion the undesirable consequences of globalization.

The problem is, however, that opening the borders and allowing factors of production to move freely across them makes it more and more difficult to maintain the welfare state. It is in the nature of this state to correct the income distribution produced by the market by transferring incomes from the top to the bottom of the income distribution. The welfare state takes from the rich and gives to the poor. This redistribution of income becomes increasingly difficult when the borders are open. The people who make a net contribution to financing the state transfer their economic activities to the low-tax countries to rid themselves of their responsibilities, and the net recipients of government resources congregate in the well-established welfare states where they make the existing financial problems even worse. Under these conditions, each individual state must endeavour to limit the extent of its redistributive measures so as not to drive away the net contributors to the government budget and not to attract the net recipients. It is difficult for the welfare state to survive undamaged in the systems competition that follows from the general freedom of movement.

This chapter deals with a basic analysis of the benefits of the welfare state and the competitive pressure placed on it by globalization. Once again, it is appropriate to look at the market failures that were the reason for the welfare state to be established in the first place and to see whether these failures show up again in the 'market' of the welfare states.

## INCOME REDISTRIBUTION AND THE SELECTION PRINCIPLE: AN INSURANCE THEORETIC INTERPRETATION

The apparent conflict between equity and efficiency and between redistributive and allocative goals is one of the great themes of economics, and all too often the state is accused of integrating redistributive elements with its insurance institutions like healthcare or public pensions. However, this view suffers from a severe misinterpretation of what redistribution really is. Redistribution and insurance are two sides of the same coin. *Ex post*, every insurance contract implies a redistribution from the lucky to the unlucky, and *ex ante*, before the 'veil of ignorance' has been lifted, most of the redistributive activities of the state can be interpreted as insurance. After all, lifetime careers are uncertain. A young person does not know how much income he will be able to earn during his working life, because he does not know which opportunities he will have, which contacts he will make, how energetic and healthy he will be and so on. The redistribution of lifetime incomes carried out by the state can be seen as a career insurance welcomed by risk-averse individuals. Authors like Friedman (1953), Harsanyi (1953), Rawls (1971), and Buchanan and Tullock (1962) have pointed this out.

The insurance provided by the state is not limited to what is generally called social security. The latter covers only a small part of state insurance protection – the whole system of redistributive taxation also provides such protection. Even the provision of public goods can be interpreted as insurance protection, in that, as income increases, the use of these goods increases far less than the taxes with which they are financed. Every school, every police officer, and every street can be understood as part of the state insurance protection to the extent that income-dependent taxes are used to finance them. Even the redistributive elements which the state is accused of integrating with its social insurance activities can themselves be seen as insurance.

Paradoxically, social security activities which bear the name 'insurance' often offer very little insurance while others which are counted as 'redistributive' are, in fact, insurance. Take for example the German social insurance system whose main element is the old-age pension. Being a pay-as-you-go system based on individual accounts with a strict proportionality between payments and pensions, this system

involves a redistribution to the introductory generations, but it hardly involves any interpersonal redistribution within a generation which could be interpreted as insurance. By way of contrast, the Solidarity Compact, which redistributes tax money from west to east Germany to compensate for the damage under communist dictatorship, can be seen as insurance against the bad luck of living in the wrong part of the country when World War II ended.

Whether a redistributive activity can be seen as insurance is largely a matter of the time perspective. Life is a random process which people can influence only to a limited extent by their own endeavours. It is in the nature of the process that a person's short-term income can be predicted better than his long-term income. From today's perspective, next year's income is not very risky and this makes it difficult for people to perceive the redistributive activities of the state as insurance. But the incomes that these people will be having in 40 years' time are hardly predictable and extremely uncertain. Redistribution of these incomes can be seen as insurance because it will not only reduce the variance of the realized frequency distribution of incomes in the population but also the variance of the probability distribution of a single individual's future income.

This aspect shows up particularly clearly when we look at it from the perspective of new parents or those who expect to become parents. It is very difficult for parents to predict what their children's journeys through life will be like. They do not know whether their children will be healthy or handicapped, talented or untalented, lazy or industrious. They do not know the teachers and the friends, the spouse and the boss, the child will have contact with. They do not know the accidents and illnesses that will happen and so on. The redistributive state offers insurance protection against such uncertainties and is welcomed in the parents' own interest. Redistribution is insurance and as such must be included in the set of state activities which are legitimated by the goal of increasing allocative efficiency.

The situation of the parents concerned about their children's future also explains why private insurance is unable to cover the career risks that the redistributive state compensates for. Private insurance simply comes too late. A private insurance solution can only come about on the basis of an individual contract with the person affected, and such a contract requires this person to be an adult. By then, however, the way the dice have been cast is mostly evident and taking out comprehensive insurance is no longer possible. Only smaller special risks,

which have narrow limits and which relate to the well-defined accompanying circumstances, can still be insured.

For adults, larger deficiencies which lead to income disadvantages can now hardly be insured because too much is known about them. A mutually advantageous insurance contract is no longer available for deficiencies which both parties know about. And deficiencies, which only the potential insurance purchaser knows about and which are possibly overlain by unknown influences, lead to the adverse selection, so often described in the insurance literature, which makes the establishment of a private insurance market difficult or even impossible.<sup>1</sup> Adverse selection means that the good risks do not participate in the insurance because the premium is too high for them. Only the bad risks demand insurance. But there may also be better risks among the bad risks for whom the premium is too high when the good risks do not participate, and they might then also decide to quit, deteriorating the quality of the risks remaining in the risk pool even further, and so on. The end result can be that no insurance market is established even though the people able to make contracts at the start of their adulthood perceive their future lives as very risky and even though they are risk averse.

It may be objected that parents do have the opportunity to take out insurance for their children. One can think, for example, of education or dowry insurance. Such an 'insurance' is, however, an intergenerational transfer of resources, not a risk consolidation between the children like that performed by redistributive taxation. It would damage the basis of our individualistic legal system if parents could commit their successful children to handing over part of their income to the less successful children of other parents.

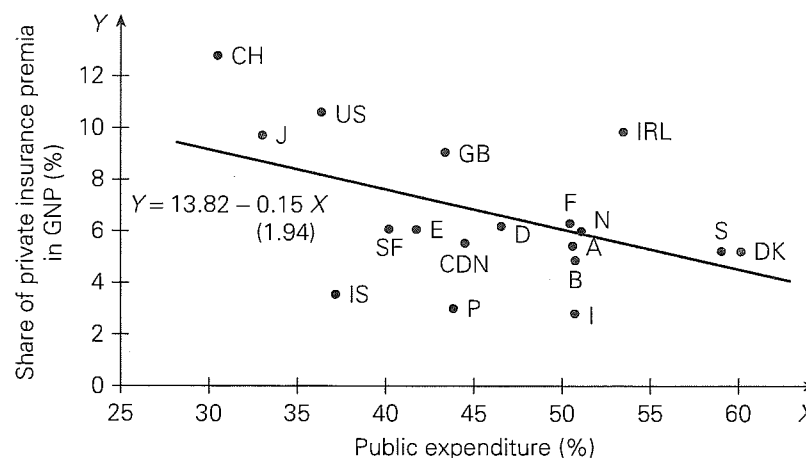
The reason why the legal system does not allow such generation crossing commitments is a deep cultural and historical question which cannot be gone into here. But the rule does exist and it can be seen as a major reason why the state has taken over the insurance of career and life risks. This reason is consistent with the Selection Principle according to which the state is only active when the private sector is unable to act.

Surprisingly, there is an extensive literature – Bulow and Summers (1984), Gordon (1985), Kaplow (1991) and Konrad (1991) – which

<sup>1</sup> See Pauly (1974), Rothschild and Stiglitz (1976), Wilson (1979) and Eisen (1979). Barr (1992) sees adverse selection as the main reason for government intervention in the insurance market.

implicitly disputes that the distributive state observes the Selection Principle. The authors cited use a variety of models to show that the state is unable to improve the risk allocation in the economy by supplying insurance. Public insurance, they argue, only drives out private insurance, which would have supplied the same protection without the state's intervention. However, the arguments put forward are ultimately not compelling because they all relate to small risks which show up at later stages in people's lives and for which, in fact, private consolidating mechanisms like insurance and stock markets exist. None of the authors consider the career and life risks that are at the centre of the state insurance protection and whose importance far exceeds that of any private insurance risk.

Of course, it cannot be denied that some of the criticism in the literature mentioned is justified. But the extent to which public insurance fails to observe the Selection Principle, and the extent to which it is in accord with this principle, are empirical questions. Certain clues for an answer are provided by a regression like that in figure 3.1.



**Figure 3.1** Violation of the Selection Principle?

*Legend:* The data relate to the year 1988 and include all OECD countries for which they are available.

*Sources:* OECD, *Historical Statistics 1960–1988*, table 6.5, p. 68 (Paris, 1990). OECD, *Insurance Statistics Yearbook 1985–1992*, table 1.1, p. 18 (Paris, 1994). OECD, *National Accounts: Main Aggregates 1960–1992*, vol. 1, table 13, pp. 124–5 (Paris, 1994). After Sinn (1996).

The figure shows private insurance premia and government expenditures as shares of the national product for all the OECD countries for which data were available. In fact the share of the private insurance premia is a declining function of the government expenditure and, with a  $t$ -value of 1.94, the correlation is highly significant. Notice that the regression coefficient is very small. An increase in the government expenditure of one percentage point results in a fall in the share of the private insurance of only 0.15 percentage points. This suggests that the largest part of the state redistributive activities cover risks other than those that can be covered by private insurance.

It may be objected that the regression should have related to quantities other than general government expenditure and private insurance expenditures. Other regressions have, in fact, been tried but they were not significant. For example, the  $t$ -value for the relationship between the share of social insurance expenditures and the private insurance share was only 0.6, and the regression coefficient was only 7%.<sup>2</sup> This information confirms the observation already made at the start that the citizens consider not only the money spent on what is customarily said to be insurance but also most government expenditure as insurance.

### REDISTRIBUTION AS AN ALLOCATIVE STATE RESPONSIBILITY: A SIMPLE MODEL

In accordance with the basic assumption of this text, it is now assumed that the rational state respects the Selection Principle. It therefore insures only those risks which the private market is unable to insure. A simple model which will be used in the next section to analyse the competition between the welfare states can capture this fact.

Consider an (initially closed) economy, which produces a homogeneous output using capital  $K$  and labour  $L$  according to the linearly homogeneous production function  $f(K, L)$ , where labour is measured in efficiency units rather than in time units. Both factors are paid according to their marginal products:  $f_K = r$ ,  $f_L = w$ . The aggregate supplies of capital and labour are constant despite the fact that, at a micro level, the individual amount of labour supplied is a random

<sup>2</sup> When the share of the expenditures for private health, accident, and life insurance is related to the government expenditure, there is a still more significant  $t$ -value of 2.2, but the regression coefficient is only 11%.

variable. The constancy of the aggregate factor supplies ensures that factor prices are constant.

The micro-randomness shows up in the random number of efficiency units of labour,  $X$ , supplied by a worker.  $X$  is the product of two non-negative stochastically independent random variables  $\theta_1$  and  $\theta_2$  which both have an expected value of 1:

$$X \equiv \theta_1 \cdot \theta_2, E X = E \theta_1 = E \theta_2 = 1.$$

The variable  $\theta_1$  describes the inborn characteristics and those acquired in childhood which are known to the individual at the start of adulthood. The variable  $\theta_2$  covers later reasons for wage variations, such as promotion or health risks, that at this point in time are still unknown. The  $\theta$  variables are stochastically independent not only over time but also between the individuals. Assuming a large economy with a large labour supply, this is compatible with the assumption that the aggregate labour supply  $L$  is constant and measures both the number of labour efficiency units and the number of workers. The workers are risk averse and, in principle, would like to take out wage insurance.

Private insurance contracts can be made at the beginning of adulthood, that is, after  $\theta_1$  is known and before  $\theta_2$  is known. They result in indemnification payments only after both  $\theta_1$  and  $\theta_2$  are known. By contrast, the protection promised by the state is defined before  $\theta_1$  and  $\theta_2$  are known.

Each individual may carry the same stochastically independent risk  $C$ ,  $C \geq 0$ , in addition to the wage risk which is still unknown at the beginning of adulthood. The individuals may also have assets  $\bar{K}$  that they can invest at the capital market interest rate  $r$ . The income of the single individual before taxation and insurance will thus be given by the equation

$$Y = \theta_1 \cdot \theta_2 \cdot w - C + r\bar{K}. \quad (3.1)$$

Because the risk  $C$  is the same for all individuals, it can be easily insured in the private insurance market. Respecting the Selection Principle the state does not include this risk in its redistribution policy. In an ideal competitive private market, insurance will be offered at a fair premium of  $\beta \cdot EC$ , where  $\beta$  is the freely chooseable degree of coverage and  $E$  is the expectation operator. Because risk-averse individuals demand full cover contracts ( $\beta = 1$ ), equation (3.1) becomes

$$Y = \theta_1 \cdot \theta_2 \cdot w - EC + r\bar{K}.$$

The insurance of  $\theta_1$  and  $\theta_2$  is more difficult than that of  $C$ . As already explained, the uncertainty about the inborn characteristics and those acquired in childhood,  $\theta_1$ , cannot be privately insured because the insurance contract is only available when  $\theta_1$  is known to at least one of the contracting parties. The 'insurance' would be a known resource transfer from one member of society to another which would never be accepted by the net payers.

The promotion and health risk  $\theta_2$  which is realized later can probably also not be insured. The variable  $\theta_2$  is a multiplicative risk that increases the life risk by augmenting the effect resulting from  $\theta_1$ . An insurance would be possible if the realization of  $\theta_1$  could be observed by both contracting parties, as then the premium could be conditioned on this realization. When, however, only the workers know what type they are, while the insurance company cannot distinguish between them, an adverse selection in the form of the better risks opting out of the insurance is to be feared.

Because of the assumption of equal and stochastically independent distributions of the  $\theta$  variables over all the workers, the realized frequency distribution of  $\theta_1$  is the same as the probability distribution of  $\theta_1$  as seen from an ex ante perspective. If  $\theta_1$  has a small variance relative to  $\theta_2$  the individuals do not differ much but face relatively large risks. Accordingly, the adverse selection is not very strong while the preference for insurance is substantial. Thus a private insurance solution for  $\theta_2$  is possible although not with full coverage contracts for the better risks. In the opposite case, where the variance of  $\theta_1$  is large relative to that of  $\theta_2$ , no market materializes for the good risks (i.e. those with very large  $\theta_1$ ), and when people are not overly risk averse it is even possible that no market at all will come into existence. In the appendix to this chapter the possibility of the non-existence of a market for wage insurance for the case of a sufficiently small constant relative risk aversion and a uniform distribution of  $\theta_1$  will be demonstrated.<sup>3</sup>

The difficulties involved with a private market solution are the main justification for a state solution. When no private market for the insurance of wage risks materializes at all, the necessity for government intervention is particularly great, but even when the adverse selection partly destroys only the market for the good risks, government insurance

<sup>3</sup> For possible non-existence of a market equilibrium with adverse selection, see Riley (1979).

can be welfare increasing. In the following it will be assumed that only  $C$  is privately insured and that private insurance is available neither for  $\theta_1$  nor for  $\theta_2$ .

Government insurance takes place through the tax system. It is assumed that the state taxes labour income at the rate  $\omega$  and that the tax revenue is returned in the form of either a uniform lump sum transfer  $T$  or publicly provided private goods available to everyone. Because  $E\theta_1 = E\theta_2 = E\theta_1 \cdot E\theta_2 = 1$ , the government budget constraint is

$$T = w \cdot \omega, \quad (3.2)$$

such that the (non-random) transfer that someone gets equals his tax burden expected ex ante. Random net income after redistribution is

$$Y = \theta_1 \cdot \theta_2 \cdot w \cdot (1 - \omega) + T - EC + r\bar{K}.$$

The mean and the standard deviation of  $Y$  are given by

$$EY = w - EC + r\bar{K} \quad (3.3)$$

and

$$SY = (1 - \omega) \cdot S(\theta_1 \cdot \theta_2) \cdot w, \quad (3.4)$$

where  $E$  and  $S$  are the expectation and standard deviation operators, respectively, when seen from an ex ante perspective where both  $\theta_1$  and  $\theta_2$  are still unknown. Equation (3.3) shows that the public redistribution does not change the expected income of an individual, but equation (3.4) makes evident that the standard deviation of the individual income falls with an increasing tax rate. As the class of the distributions which can be generated with alternative tax rates is a linear class, it follows directly that the expected utility of each of the identical risk-averse individuals increases.<sup>4</sup> This confirms that the introduction of a welfare state results in an unambiguous efficiency gain.

<sup>4</sup> The distributions  $Y_1, Y_2, \dots, Y_n$  are said to be members of a linear class when they all have the same standardized form  $Z = (Y_i - EY_i)/SY_i$ ,  $i = 1, \dots, n$ . For linear distribution classes, the so called  $\mu - \sigma$  criterion coincides with the expected utility criterion in the sense that the choices under risk implied by any arbitrarily given von Neumann-Morgenstern function can be exactly represented by a set of indifference curves in  $\mu - \sigma$  space where  $\mu$  is the mean and  $\sigma$  the standard deviation of a probability distribution. See Sinn (1980, chapter 2, section D).

**Proposition 3.1:** *By redistributing income, the state can make available to its citizens a welfare increasing insurance against the risk of unequal inborn capabilities and other unequal exogenous influences on the life income, which private insurance cannot supply. Private insurance presupposes private contracts and thus it comes too late in the life cycle to avoid the problem of adverse selection.*

It is self-evident that the increase in welfare through the redistribution of income is just a possibility and not a necessity. In reality, and in realistic models, the fact that redistributive activities have considerable moral hazard effects must be taken into account. These effects are, however, very well known and do not need to be discussed here. They are the main object of the microeconomic theory of tax distortions. The moral hazard effects reduce the advantage of the insurance protection and are an obstacle to excessive redistributive activities of the state. However, they are second-order effects which cannot nullify the first-order effect of an increase in expected utility resulting from the first bit of redistribution. Thus, a boundary solution with no redistribution at all cannot be optimal. Some redistribution in the sense of an insurance protection is always worth while, even when undesirable behaviour results.<sup>5</sup>

## THE END OF THE WELFARE STATE IN TAX COMPETITION

A private insurance market can only develop its welfare increasing effect if the contracts are settled before the risks have been resolved and if they involve binding redistribution rules without allowing for entry and exit ex post (i.e. after knowing who was lucky and who was unlucky). The situation is no different with government insurance through the redistributive tax system. It cannot be permitted that people who know they had good luck (and realize  $\theta_1 > 1$  or  $\theta_1 \cdot \theta_2 > 1$ ) opt out of the system and that others who know that they had bad luck opt in. Like a private insurance, government insurance would go bankrupt under such circumstances.

<sup>5</sup> An explicit model with government redistributive policy and moral hazard can be found in Sinn (1995). See Shavell (1979) for the general theory of moral hazard in insurance.

This is of crucial importance for the European welfare state. When the borders of the European countries were still closed, maintaining the 'social contract' was not a critical condition. Today, however, where the European Union's goal of freedom of movement has largely been realized, it has become a serious problem. Opting out in the case of good luck and opting in in the case of bad luck has become increasingly easy.

The model described above can be generalized to the case of open borders. Assume a symmetrical world with  $n$  identical countries, with the same technical knowledge, identical populations and identical risks, where goods, capital and people can all move freely and without any migration cost among the countries.<sup>6</sup> Even if the workers were not mobile, the factor price equalization mechanism would ensure equal constant interest rates and gross wage rates per efficiency unit of labour in all the countries. With such a mobility, this must hold a fortiori:

$$r_i = r_j \equiv r = \text{const.}, w_i = w_j \equiv w = \text{const.} \quad \forall i, j = 1, \dots, n. \quad (3.5)$$

When, as has to be realistically assumed, labour can move freely not only before but also after the risk has evolved, an additional condition for an equilibrium in the labour market is the equality of the net wage and transfer incomes for all types of workers, that is, for all realized variates of  $\theta_1 \cdot \theta_2$ . It thus holds that

$$\theta_1 \cdot \theta_2 \cdot w \cdot (1 - \omega_i) + T_i = \theta_1 \cdot \theta_2 \cdot w \cdot (1 - \omega_j) + T_j \\ \forall i, j = 1, \dots, n \text{ and } \forall \theta_1 \cdot \theta_2, \quad (3.6)$$

which, because  $T_i = \omega_i \cdot w$  from (3.4), is equivalent to the condition

$$w \cdot [\theta_1 \cdot \theta_2 - \omega_i(\theta_1 \cdot \theta_2 - 1)] = w \cdot [\theta_1 \cdot \theta_2 - \omega_j(\theta_1 \cdot \theta_2 - 1)] \\ \forall i, j = 1, \dots, n \text{ and } \forall \theta_1 \cdot \theta_2 \quad (3.7)$$

and finally also to the condition

$$\omega_i = \omega_j \quad \forall i, j = 1, \dots, n. \quad (3.8)$$

Equal tax rates in all countries will therefore be necessary for an equilibrium in the labour and capital markets.

<sup>6</sup> See chapter 4 for an analysis of migration costs.

An equilibrium in systems competition assumes an equilibrium in the labour and capital markets and therefore requires that the conditions (3.5)–(3.8) be met. In addition it is, however, necessary that no country has the opportunity to improve the situation of its own citizens by changing the tax rates. It can easily be shown that this requirement is inconsistent with positive tax rates.

Assume that, initially, all countries have the same strictly positive tax rate on labour income. In this situation, the individual country has an incentive to undercut the tax rate of the other countries and to reduce its transfers so as to attract the rich and deter the poor. Consider, for example, the possibility that country  $i$  reduces its tax rate and its lump sum transfer in a way that the government budget would remain balanced if no migration occurred. (Compare equation (3.2).) This policy is a Pareto improvement with regard to all groups of people in which the government can potentially have an interest. 'Rich' domestic residents with  $\theta_1 \cdot \theta_2 > 1$  gain from the policy because they pay less. (This can be seen immediately when we consider that the left side of equation (3.7) is larger than the right side.) 'Rich' foreigners with  $\theta_1 \cdot \theta_2 > 1$  who immigrate so as to take advantage of this policy also gain. The 'poor' domestic residents with  $\theta_1 \cdot \theta_2 < 1$  would lose if they stayed at home. But they do not stay. They always are able to emigrate and to work in other countries under the same conditions that would have applied at home without the tax reduction. This way they get to keep their income and utility levels. People with average level incomes ( $\theta_1 \cdot \theta_2 = 1$ ) are not affected by the policy.

Because net payers of government benefits immigrate and net recipients emigrate, such a policy will result in a budget surplus. There is even a strict income advantage for all groups of society in which the government can have an interest if this surplus is used to promote the emigration of the people at the lower income levels (with  $\theta_1 \cdot \theta_2 < 1$ ). This strengthens the conclusion that a competitive equilibrium with insurance protection through redistribution does not exist within the framework of the present model.<sup>7</sup>

<sup>7</sup> A situation without taxes is the only possible equilibrium in the present model. A state that departs from this equilibrium by demanding positive taxes, which it tries to convert into lump sum transfers, drives the 'rich' tax payers away and attracts the 'poor' net recipients of government benefits. The policy cannot be financed because there is a budget deficit. A state that departs from the equilibrium in a downward direction by choosing a wage subsidy to be financed with lump sum taxes now drives away the 'poor' net payers and attracts the 'rich' net recipients of public funds. Once again there is a budget deficit which makes it impossible to finance this departure.

**Proposition 3.2:** *Although welfare states may be Pareto optimal and may, for that reason, come into existence in a world with closed national borders, they cannot survive when the factors of production are free to move across the borders. Each nation will find it Pareto optimal to dismantle its welfare state, given the fiscal situation in others, and an equilibrium in systems competition will not be reached before the welfare states have disappeared.*

The end of the welfare state is a loss of welfare not only in terms of some utilitarian or moralistic postulate but also in terms of strict allocative efficiency criteria. From the point of view of a single country, it is a Pareto improvement if it cuts back its redistribution system, given the behaviour of other countries, but when all countries do that, there is, in fact, a Pareto deterioration. Because the countries decide individually and not collectively, they end up in a situation which, from an ex ante point of view, provides for all citizens a lower level of expected utility than would have been achievable without tax competition.<sup>8</sup>

The Selection Principle, which implies that the state only insures those risks which cannot be insured privately, can once again be identified as the deeper reason for the failure of systems competition. Private insurance is not possible because it comes too late. It cannot cover the risks which are already resolved when people become adults, and with the remaining lifetime risks still unresolved at that stage it founders on the adverse selection of the bad risks. In a closed economy the state can solve the problem by providing the insurance through the government budget. It has the power to enforce the necessary transfer of resources from the successful to the unsuccessful without being dependent on voluntary private contracts and the corresponding minimum age of insurees. In an open economy, however, where people have the right to change their place of residence, this power vanishes. Good risks leave the welfare state and bad risks seek it out. Systems competition obviously suffers from the kind of market failure that prevented private insurance from coming into existence and that originally caused the state to intervene. Only when the state does not take account of the Selection Principle and supplies, in accordance

<sup>8</sup> The difficulties of the welfare state in tax competition have been described many times in the literature with the use of positive analysis. See Musgrave (1969), Oates (1972) or, more recent papers, Wildasin (1991, 1992). The Paretian welfare implications of the tax competition have, however, as far as the author knows, never received any attention.

with the civil law, binding insurance contracts for the privately insurable risks which are resolved later in life (*C* in the above model), is there no need to fear systems competition, as such contracts must then be respected even when the insured leaves the state.

## THE HOME COUNTRY PRINCIPLE

The approach uses a rather abstract migration model to demonstrate the vulnerability of the welfare state. Of course, much more sophisticated models with migration costs, moral hazard and different categories of labour could be thought of. However, even in these models it will be true that migration creates a severe policy externality between the different countries that reduces the national incentives to maintain a welfare state. A country that decides to extend its redistributive activities will expel some of the rich to, and attract some of the poor from, other countries. This will, in these countries, change the relative scarcity and the remuneration of the factors of production in a way that tends to reduce income inequality. The factors offered by the rich – such as high-quality labour and capital – will become more abundant and so the incomes of the rich will decline. The factors offered by the poor – especially simple labour – will become scarcer and will be able to earn a higher factor income. Thus the acting country helps the other countries to achieve their social objectives and exerts a positive policy externality. Since this externality is not taken into account by the acting country when it tries to find a compromise between conflicting policy goals, the scope of redistributive activities chosen in isolation is too small.

For the European welfare state this situation is alarming. The international factor price equalization which results from globalization increases the need for welfare aid in the high-wage countries, but, at the same time, the welfare state is being eroded by the pressures of systems competition. The fear expressed at the outset of this chapter is confirmed.

The erosive forces of systems competition have been at work for a long time in the United States and have led to an obvious deficiency in social welfare. Only a few years ago, New York City was on the brink of bankruptcy when it attempted to counter the laws of systems competition with the introduction of a very generous social legislation.

The poor moved there from all over America and held their hands out. This forced New York to cut back its generosity. No European state would be able to continue its effective social welfare policy with the kind of mobility found in America. It is true that Europe is not America, but it is becoming like America.

As explained in the introductory chapter, the planned eastern enlargement is currently contributing to the urgency of the problem. After 2004, millions of people from the east European member countries, whose wages will even then be less than one-fifth of the wage in the west, will seek entry to the western welfare states, and their differential mobility will be extremely high. Once the decision to leave their home countries has been made, the determined migrants will be fully flexible with regard to their target countries and react to even small economic stimuli. Under these circumstances, no country will be able to afford becoming a welfare magnet, and social benefits are likely to be cut on a large scale. Countermeasures are needed to prevent this from happening.

At first sight it would appear that harmonizing the redistributive tax and expenditure systems could be one of these countermeasures. Such harmonization is, however, scarcely realizable, given the large prevailing income differences between the European countries, because any reasonable definition of poverty and social need must refer to each country's idiosyncratic conditions rather than a European average. The progressive tariffs of income taxes alone would lead to problems which could not be overcome. With a uniform Europe-wide tariff, the average tax rate of a country would be higher the higher its average income, and there would then be an international, in addition to the interpersonal, redistribution of incomes which benefits the citizens of one country at the expense of those of others.

A better countermeasure would be abolishing or limiting the inclusion principle which has become one of the dominant legal principles for work-related welfare payments in Europe. The inclusion principle is the deeper reason for the difficulties of maintaining the European welfare state. It holds that, regardless of the country of origin, a person pays taxes and claims benefits in the country where he or she lives and works. Without the inclusion principle the deterrence competition described above could not be triggered off.

The home country principle is an alternative. In its strict form, the home country principle states that the country in which a person was born remains responsible for the welfare aid this person receives and

the redistributive taxes he or she pays.<sup>9</sup> When the home country principle is applied there will be no tax flight and no artificial migration incentives, because no one can improve his or her net fiscal position by migrating to another country. There will be migration, but it will be driven by the genuine incentives of the market economy rather than the artificial incentives set by the welfare state. With a single stroke the welfare policy of the national governments could be freed from having to take into account the migration processes it itself causes, and the forces eroding the welfare state would be tamed.

There are important examples for a partial implementation of the home country principle. Swiss cities provide certain kinds of welfare assistance to their inborn citizens even if they live elsewhere. The United States practises a world-wide income concept forcing American firms and individuals operating and living abroad to declare their incomes and pay taxes in the US. Even the EU itself practises a rather strict form of the home country principle for internal migrants who have not come for the purpose of working by excluding them from social aid and similar benefits. The foreign recipients of social aid must work and earn a sufficiently low income or they must previously have worked in the country where they claim social benefits. Otherwise, they must apply for support in their home country.

In its strict form the home country principle cannot easily be implemented if only because, as explained initially, much redistribution takes place in the form of free provision of public goods. Also, it seems plausible to integrate immigrants at some stage fully into the fiscal system of their host country, because a strong fiscal imbalance is a phenomenon that tends to disappear over time, at least when the lower end of the income distribution is considered. Based on recent German immigration data, the Ifo Institute (Sinn et al., 2001) found that during the first ten years of their presence in Germany, the net benefits (monetary transfers and fiscal cost of free access to impure public goods minus taxes and contributions paid) which immigrants received amounted to €2300 per person and year. However, after 20 years, the few people who had stayed had actually become net contributors to the government budget. The principle of 'delayed integration into the welfare state', as recommended by the Scientific Council of the German Ministry of Finance (2001) and the Ifo Institute, therefore, seems to

<sup>9</sup> See also Sinn (1990) and Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (1994).

be a reasonable response of EU immigration policy. According to the principle of delayed integration, immigrants would immediately be included in the tax and contribution system of the host country and they would have free access to all public facilities and contribution-financed social benefits. However, certain tax-financed benefits such as social aid and subsidized government housing would be available only after a transition period of, say, seven years so as to secure a rough fiscal balance during this period of time. The principle of delayed integration would reduce the artificial migration incentives provided by the welfare state. In particular, it would help avoid the erosion of the European welfare state via a process of deterrence competition without recurring to harmonization or even more interventionist actions by central authorities such as the postponement of some of the basic liberties granted in the Treaty of Rome.<sup>10</sup>

### Appendix to Chapter 3 The Non-Existence of a Market for Wage Insurance

This appendix shows that the assumptions under which the redistribution policy of the state is a Pareto improvement for the citizens are compatible with the possibility that adverse selection prevents a competitive private market for wage insurance to come into existence at the beginning of adulthood. It relates to the model described in section 3 of this chapter.

Because in a genuine competitive market individuals can buy coverage from several insurance companies simultaneously, the analysis can be limited to the so-called pooling equilibria. An individual can buy an arbitrary number of units of coverage at a fixed premium per unit of coverage, and the insuree is unable to make this premium dependent on the number of units bought. Let  $\beta$  indicate the degree of insurance coverage. Assume that competition enforces mathematically fair insurance premia on average without any loading on top of the expected indemnification payments. Of course, such premia are unfair for the better risks and lower than fair for the worse risks.

<sup>10</sup> At the time of writing it seems likely that the EU will impose quantity constraints on westward migration from the new member countries, one of the most rigid dirigiste policy measures conceivable, violating the freedom of settlement, one of the four basic freedoms of the Treaty of Rome.

It is assumed that the utility function of the households is characterized by constant relative risk aversion whose value is sufficiently small, an assumption that will become clear below. Assume further that  $EC = r\bar{K}$  so that the individual income can be reduced to the expression  $w \cdot \theta_1 \cdot \theta_2$ . The insurance market is opened after  $\theta_1$  has become known but before  $\theta_2$  is known. It is assumed that the variable  $\theta_1$  is distributed equally over the range  $0 \leq \theta_1 \leq \theta_1^{\max}$ . Due to the assumption of stochastic independence among the individuals the ex ante probability distribution of  $\theta_1$  is identical to the ex post frequency distribution of  $\theta_1$  in the total population. No particular assumptions on  $\theta_2$  are necessary.  $\theta_2$  is a strictly positive random variable with an arbitrary but non-degenerate distribution. The question is whether the income  $w \cdot \theta_1 \cdot \theta_2$  is insurable if each insuree knows his respective variate of  $\theta_1$ , but the insurer does not. Both parties are equally ignorant about  $\theta_2$ , but they know the probability distribution of this random variable.

The non-existence of an insurance equilibrium can be proved with the aid of figure A3.1 which shows the decision situation of an expected utility maximizer in terms of the mean  $EY$  and the standard deviation  $SY$  of his income according to the insurance approach developed in

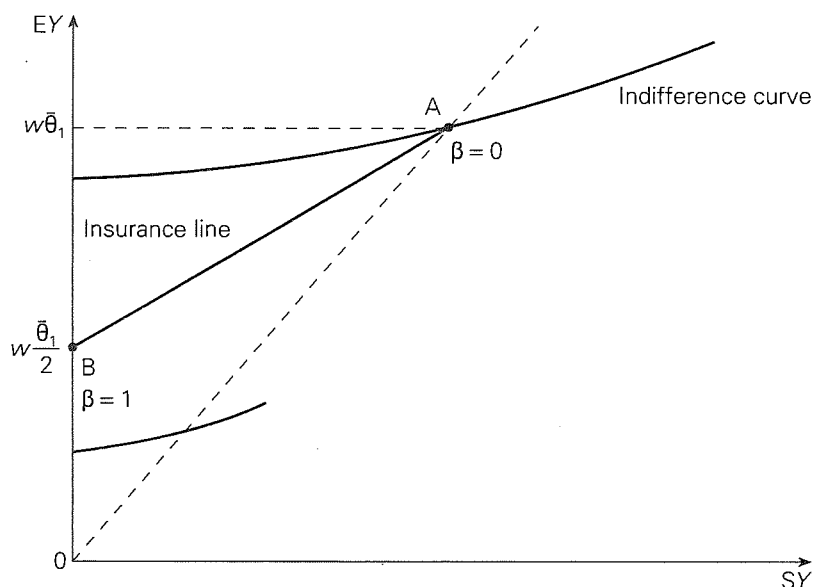


Figure A3.1 The non-existence of an insurance equilibrium.

Sinn (1980, chapter V C). Because he can freely choose his degree of coverage between zero and one, each potential insurance purchaser faces an opportunity set of decision alternatives which in the diagram can be represented by a straight line from some point with positive standard deviation and positive mean towards the ordinate. If  $\beta = 0$ , this point is reached, and by increasing  $\beta$  it is possible to move along the line towards the ordinate which is reached when  $\beta = 1$ . If the premium is fair, the line is horizontal; if there is a positive loading beyond the expected indemnification payment, it has a positive slope such as the line AB in the figure.

In the present context, preference structures based on mean and standard deviation can be assumed without any loss of generality, because all the probability distributions to be compared belong to the same linear class.<sup>11</sup> When a linear class prevails, the assumption of a constant relative risk aversion transforms into a homothetic system of convex and positively sloped indifference curves whose uniform slope along a ray through the origin is an increasing function of the coefficient of relative risk aversion (Sinn 1980, chapter III).

Let the variates of  $\theta_1$  denote the existing risk types where a risk type is said to be 'better' than another one if the variate obtains a higher value. If a non-degenerate equilibrium in the insurance market exists, a type  $\bar{\theta}_1$  with  $0 < \bar{\theta}_1 \leq \theta_1^{\max}$  must exist which buys insurance. If the only type who buys insurance is the worst type with  $\theta_1 = 0$ , the insurance market has a mass of zero and is degenerate. The proof demonstrates that type  $\bar{\theta}_1$  does not exist if the degree of relative risk aversion is sufficiently small.

Consider the decision problem of type  $\bar{\theta}_1$  and assume first that this type is the best of all types (i.e. that  $\bar{\theta}_1 = \theta_1^{\max}$ ). Assume for a moment also that the worse risks with  $\theta_1 < \bar{\theta}_1$  all buy the same coverage as  $\bar{\theta}_1$  does, such that the premium per unit of coverage is unfair for type  $\bar{\theta}_1$ .

The figure demonstrates the choice set of risk type  $\bar{\theta}_1$ . Let point A characterize this type's expected income and standard deviation without insurance. Since  $E\theta_2 = 1$ , the expected wage income  $EY$  is  $w\bar{\theta}_1$ . The standard deviation is jointly determined by the non-random variate  $\bar{\theta}_1$  and the random variable  $\theta_2$ :  $SY = \bar{\theta}_1 \cdot w \cdot S\theta_2$ . It is given by the distance of point A from the ordinate. An insurance line goes from point A downwards to the left, to point B on the ordinate; point B characterizes the expected value and the standard deviation of income

<sup>11</sup> See footnote 4 above.

with full coverage insurance. The insurance line is the locus of those points which type  $\bar{\theta}_1$  can reach by varying its degree of insurance coverage  $\beta$ , assuming, as mentioned, that all other types with  $\theta_1 < \bar{\theta}_1$  always choose that same degree of coverage. In the case  $\beta = 0$ , point A prevails; in the case  $\beta = 1$ , point B prevails; and in the intermediate cases points on the insurance line prevail. When full coverage is bought,  $\beta = 1$ , the standard deviation is equal to zero and the expected post-insurance income equals the average wage income of all individuals with  $\theta_1 \leq \bar{\theta}_1$ . Because of the assumed uniform distribution, the average  $\theta_1$ -value is  $\bar{\theta}_1/2$ , and the average wage income is  $w\bar{\theta}_1/2$ . In general, the expected value and the standard deviation of the post-insurance income of risk type  $\bar{\theta}_1$  are given by

$$\begin{aligned} EY &= \beta(w\bar{\theta}_1/2) + (1 - \beta)w\bar{\theta}_1 \\ &= w\bar{\theta}_1 \left(1 - \frac{\beta}{2}\right) \end{aligned} \quad (\text{A3.1})$$

and

$$SY = (1 - \beta)w\bar{\theta}_1 S\theta_2, \quad (\text{A3.2})$$

where E and S are the expectation and standard deviation operators. (A3.1) and (A3.2) define the insurance line.

Assume that, as in the figure, the indifference curves are sufficiently flat such that the insurance line cuts the indifference curves from below. Then no intermediate solution with a strictly positive degree of coverage is possible, and type  $\bar{\theta}_1$  chooses  $\beta = 0$ .

Let us now remove the temporary assumption that all types with  $\theta_1 < \bar{\theta}_1$  buy the same degree of coverage as type  $\bar{\theta}_1$ . As the other types are worse risks, at least some of them may decide to buy insurance. This means that the composition of the risk pool is worse than assumed and the premium per degree of coverage is higher: the insurance line is steeper than shown in the figure. This a fortiori means that  $\bar{\theta}_1$  does not buy any insurance.

The discussion thus far referred to the case where  $\bar{\theta}_1$  is the best of all risk types ( $\bar{\theta}_1 = \theta_1^{\max}$ ). Since the best type does not participate, consider a slightly worse one with  $\bar{\theta}_1 < \theta_1^{\max}$ . In the figure points A and B move downwards along rays through the origin without changing the slope of the insurance line. Since the homotheticity of the indifference

curves (constant relative risk aversion) ensures that the slope of the indifference curve through the new point A does not change either, it remains true that type  $\bar{\theta}_1$  does not buy any insurance. Moreover, an individual of type  $\theta_1^{\max}$  will not change his mind and decide to buy insurance if the other members of his type do not participate since the insurance conditions are now even worse than before. Extending the analysis to successively lower values of  $\bar{\theta}_1$  and eliminating the respective better risks from the pooling shows by induction that no  $\bar{\theta}_1 > 0$  can be found which buys positive amounts of insurance. Thus, no private insurance market is possible, Q.E.D.

## Social Dumping in the Transformation Process?<sup>1</sup>

### THE ACCUSATION OF SOCIAL DUMPING

Business representatives and union leaders in highly industrialized countries often accuse the governments of lesser developed and catching-up countries of practising social dumping in the sense of maintaining an underdeveloped welfare state to create a competitive cost advantage for their own industries. In particular they argue that these countries deliberately neglect the legislation for good social standards in terms of social fringe benefits, protection against injuries, pension schemes, co-determination rights and the like. To stop the seemingly unfair competition resulting from social dumping they postulate an international harmonization of social conditions, and sometimes they even advocate retaliatory trade restrictions to enforce the harmonization.

International agreements like those of the International Labour Organization (ILO) or the EU Social Charter reflect this influence in that they define a number of social minimum standards which are binding for the signing parties. The EU Social Charter prescribes a weekly maximum working time, minimum recreation periods, minimum safety standards for new and old machinery, rules for the employment of minors, equal treatment of gender, minimum times for maternity leaves, dismissal protection rules for pregnant women and

many additional workers' rights.<sup>2</sup> Similarly, the ILO members have agreed to establish a system of labour standards<sup>3</sup> regarding minimum wages, maximum working hours per week and minimum rest time per week, a guaranteed number of holidays with pay and the prohibition of the worst forms of child labour.

This chapter will analyse the motives for low labour standards in lesser developed or catching-up countries and examine the justification for harmonization agreements like the EU Social Charter and the ILO conventions. For this purpose it will model the transition growth path of a lesser developed country that joins a well-developed economic core area.<sup>4</sup> The EU eastern enlargement can be taken as an example of this problem. Before joining, the lesser developed country has a very low labour productivity, low wages and low social standards, but after joining it will catch up by sending guest workers to the core region and attracting capital investment. Because of the factor mobility, factor prices will change and the national government of the joining country will continuously revise its social policies. The question is whether the transition process brought about jointly by private market forces and the forces of systems competition is efficient in any meaningful sense and whether, if it is not, supra-national actions such as the above-mentioned harmonization agreements are necessary to improve the allocation of resources.

<sup>2</sup> Social Community charter of the fundamental social rights of workers, COM (89) 248 final. See also Berié (1993) and Feldmann (1999).

<sup>3</sup> A comprehensive introduction to ILO's labour standards can be found in Plant (1994). ILO has issued a total of 183 conventions on labour standards to date. See, in particular:

the minimum wage fixing convention

(No. 131, <http://ilolex.ilo.ch:1567/scripts/convde.pl?C131>),

the hours of work (industry) convention

(No. 1, <http://ilolex.ilo.ch:1567/scripts/convde.pl?C1>),

the weekly rest (industry) convention

(No. 14, <http://ilolex.ilo.ch:1567/scripts/convde.pl?C14>),

the holidays with pay convention (revised)

(No. 132, <http://ilolex.ilo.ch:1567/scripts/convde.pl?C132>) and

the worst forms of child labour convention

(No. 182, <http://ilolex.ilo.ch:1567/scripts/convde.pl?C182>).

<sup>4</sup> The model is an extension of Sinn (2000) to the case of transition with endogenous setting of wage-related standards.

<sup>1</sup> This chapter is dedicated to Assaf Razin. It will also appear in a Festschrift on the occasion of his sixtieth birthday.

## REDISTRIBUTION VS. WAGES IN KIND

Analysing the accusation of social dumping is not a trivial exercise because it refers to two completely different phenomena which are often confused. One refers to wages, working conditions and wage-related fringe benefits that make up the employers' labour costs. The other refers to the redistribution of resources between different types of individuals, such as tax-financed transfers to the poor.

The second type of social dumping was analysed in the previous chapter. As was shown, income redistribution between the rich and the poor will indeed be eroded in systems competition. From the point of view of an individual country, redistribution among mobile income earners is not rational. For one thing, redistribution cannot effectively change the distribution of net incomes when labour can migrate across the borders and wages react to this migration. For another, redistribution creates budgetary problems for the government by attracting the people who receive government benefits and driving away those who pay for them. As redistribution is eroded even when, from an *ex ante* perspective, it is in the general interest of risk-averse citizens from all countries, a failure of systems competition can be stated. This may be called social dumping, though 'welfare dumping' seems to be a more appropriate name. What business and union leaders have in mind when they speak about social dumping, however, seems to be working conditions, wages and wage-related fringe benefits, which all have a direct impact on the wage cost and on the competitive situation of their firms.

It is undoubtedly the case that in countries like Portugal or Spain, not only the wages themselves but also the safety standards in the firms, the social insurance contributions, the number of holidays, the length of maternity leave, the payment of wages in cases of sickness, the safety regulation for workplaces and similar achievements of the welfare state are well below those in the more advanced European countries like Sweden or Germany. The accusation made is that the low wage standards are, at least partly, the result of a conscious policy of social dumping which is carried out intentionally, or at least tolerated, by the national governments of the catching-up countries. These governments, it is maintained, stick to low social standards, because they know that competitive advantages for the domestic industries result.

The social standards meant in this context can best be understood as wages in kind prescribed by the government. Surely the utility of

workers increases if they receive better safety standards and other wage-related fringe benefits, just as a pecuniary wage payment increases their utility, and surely the firms' labour costs increase if they have to provide these benefits, just as they would with a pecuniary wage increase. As both the pecuniary wage and the wage in kind are to be paid from the same marginal value product of labour, public legislation on wages in kind does not involve a redistribution of resources between different groups of individuals. It is instead similar to legislators setting wages themselves.

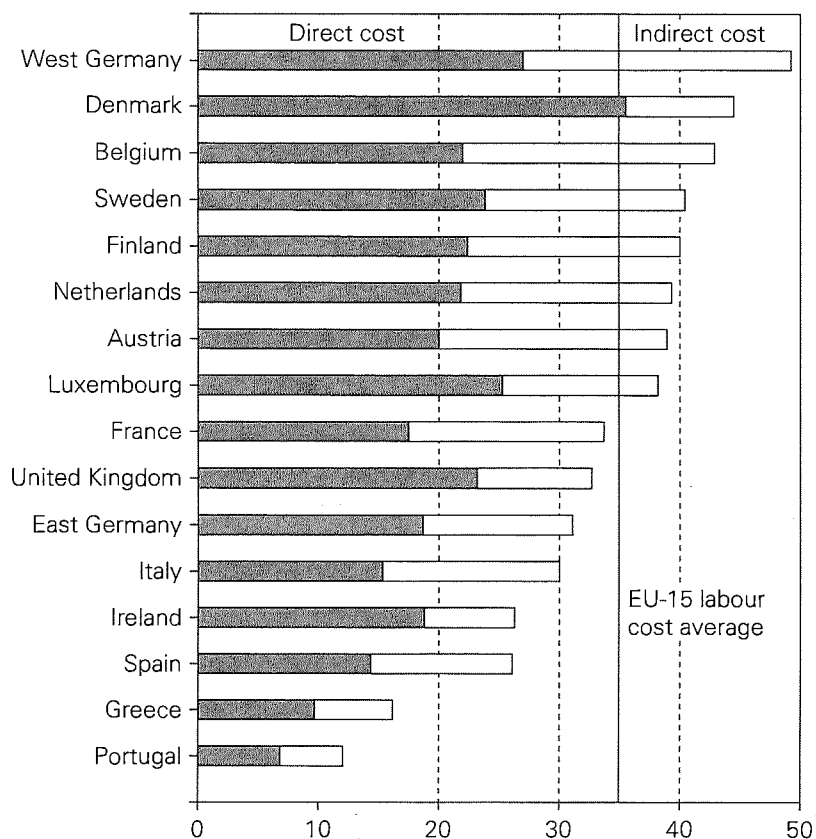
This demonstrates that the two potential reasons for social dumping should not be lumped together. They refer to completely different economic phenomena, and the similarity is purely semantic, notwithstanding the fact that they both may appear simultaneously with actual policy measures. Welfare dumping is not wage dumping, but social dumping with insufficient standards is!

## WHY ARE THE DIFFERENCES IN DIRECT AND INDIRECT WAGE COSTS SO HIGH?

As was argued in the introductory chapter, there are at present considerable differences in gross hourly wage costs in the EU. While the average wage cost is about €18, the differences between the two countries with the highest and the two countries with the lowest wage costs exceed €10 per hour, and one-third of the countries have wage costs which are more than three times as high as those of the two countries with the lowest costs. Figure 4.1 gives an overview of the wage differences among the European countries.

The figure breaks down the wage costs into direct and indirect costs according to the Eurostat definitions.<sup>5</sup> Direct costs are defined as gross wages per hour, basically the official annual pay divided by the number of working hours. They include the employees' social security contributions, overtime supplements, shift compensation, regularly paid premia, pay for vacation and national holidays, year-end bonuses and similar items. Indirect costs consist of employer social insurance contributions, sick pay schemes, and other social expenses such as those for sports facilities, canteens, medical services and vocational training. Indirect wage costs according to the Eurostat definitions are part of

<sup>5</sup> See Schröder (2000, p. 77).



**Figure 4.1** Labour cost in manufacturing in European countries 1999 (euros per working hour).

Note: Labour cost of male and female workers. The 1999 EU-15 average is a weighted average with working population (Eurostat, *Eurostatistics* 11/2000, p. 45) as weights.

Source: Institut der deutschen Wirtschaft (database, 2000).

what this chapter considers as the costs of social standards; however, they do not exhaust this category of wage costs. Co-determination rights of workers, safety requirements for machinery, dismissal protection rules or constraints on working time incur additional indirect wage costs which are not included in the official definitions.

Despite these omissions the indirect wage costs shown in figure 4.1 are substantial, sometimes covering 40% of the total wage costs or

more. They clearly are important determinants of the competitiveness of the single countries. Note that countries with a high direct wage also tend to have a high indirect wage. This points to a systematic relationship that will be explored below.

The business and union representatives argue that the large differences in wages and labour standards shown in figure 4.1 are incompatible with a common European market where no trade restrictions prevail and the freedom of settlement is granted. In such a market wages and working conditions should be the same to ensure fair competition among the European countries. The fact that they are not the same, it is maintained, indicates social dumping and should be seen as an unhealthy implication of systems competition which ought to be overcome by extending the scope of common European wage and working standards. However, the argument neglects the fact that differences in wages and working conditions may partly reflect natural transitional phenomena during the adjustment phase towards a uniform European economy. After all, a truly common market without customs barriers and full economic freedom was not achieved until the 1990s. Europe may still be in a convergence phase in which differences are shrinking. If this phase is driven by natural forces it is not clear that the convergence process could be improved by European harmonization agreements that force the countries to converge faster in selected areas than they would have done had they been able to make unilateral decisions. In fact, as will be explored below, an overly hasty artificial harmonization of the kind carried out after German unification can be extremely dangerous for the European economy.

The important aspect of the convergence process is the existence of frictions in the form of adjustment and migration costs. The abstraction from such frictions is appropriate for a long-run analysis, such as the one carried out in the previous chapter. Indeed, the new freedom of movement in Europe will, in the long run, lead to a general convergence of economic conditions, and there can be little doubt that the mechanism of factor price equalization assumed there and described more fully by the foreign trade literature will eventually make their effects felt. With unrestricted exchange of goods, free choice of workplace and free capital movements, the current differences in overall wage costs certainly cannot be maintained. Countries like Ireland, Spain, Portugal and Greece will find their factor prices converging towards those of the European core countries.

However, because of the frictions, an equality of factor prices cannot come about overnight. It may take decades for even an approximate equality to be reached, and a perfect equalization will, of course, never happen in practice. The main reason for the delay is the time needed for the accumulation of a modern stock of capital in the countries that are still lagging behind. It is true that financial capital is as nimble as a deer: what matters, however, is real capital, and real capital is as slow as a tortoise. Real capital faces substantial adjustment costs. Many kinds of obstacles must be overcome before it can move into low-wage areas. These obstacles include management constraints, the sequential nature of building processes, the roundaboutness of multi-firm production chains, learning-by-doing constraints, the initial lack of public infrastructure and, last but not least, the time-consuming construction of the economic and political institutions which are the backbone of efficient modern market economies.

When accumulation of real capital is slow, wages, too, lag for a long time behind those in the more developed regions, and workers in the less developed areas have strong incentives to migrate to the high-wage countries as guest workers. Compared to capital, guest workers are very mobile. Many of them may come in the short term when the wage differences are large, but they return very quickly to their home countries when these differences become smaller. Nevertheless, guest workers face considerable migration costs. These show up less in migration delays than in the fact that many people prefer to stay in their own countries even when wage differentials are large. Objective and subjective costs prevent these people from simply maximizing their wages income. Looked at in this way, persistent differences in pecuniary wages between the developed and the less well-developed countries of Europe seem quite natural for a long period to come despite the extension of the four basic freedoms granted in the Treaty of Rome.

Social standards are not directly explained by market forces because they are typically set by the government. Nevertheless, they may be explained indirectly, since it makes little sense for a government to prescribe in-kind benefits to workers that are out of proportion to the direct wages agreed to in private labour contracts. In the light of the empirical information given in figure 4.1 it seems plausible to expect governments to develop the social standards in proportion with the direct wages paid, taking the stages of their respective countries' developments into account. A sluggish adjustment of social standards may

also be a natural feature of a transformation process which leads to alignment with the economic conditions in the developed regions only in the very long run.

## A SIMPLE MODEL OF THE ECONOMIC CATCHING-UP PROCESS

To analyse these issues formally, the transformation process of an initially lesser developed country that joins a developed economic area will be modelled. The purpose of the model is to help understand the market forces and the actions of national governments in order to find an answer to the question of whether an international harmonization of labour standards and wages could improve the allocation of resources. Three levels in the hierarchy of decision problems will be considered: (i) individual optimization and market equilibrium, given the national standard policy, (ii) national optimization by the competitive government in terms of setting the time path of standards, and (iii) supra-national optimization to see whether the equilibrium in systems competition is efficient and to take counteracting harmonization measures if necessary. This section considers the first of these levels. The other levels are analysed in the following sections.

Consider a small, lesser developed 'joining' country which opens its borders to a large already developed 'core area'. Goods, financial capital and technical knowledge are completely mobile across the country's borders. The uniform goods prices are normalized to one, and the uniform financial market interest rate is set in the core area, and potentially in the rest of the world, at the level  $r$ .<sup>6</sup>

Real capital and labour are mobile only to a limited extent and, as discussed above, in different degrees. Real capital can only migrate slowly, but, in principle, it has no lasting location preferences for one area or another; what matters is the return that can be generated. Investments in the joining country,  $I$ , result in convex adjustment costs  $\varphi(I)$  which reduce the speed of capital adjustment. It is assumed that  $\varphi(0) = \varphi'(0) = 0$ ,  $\varphi' < 0$  for  $I < 0$ ,  $\varphi' > 0$  for  $I > 0$ , and  $\varphi'' > 0$ . By contrast, labour can migrate very quickly – a train journey of a few hours is often sufficient to reach a workplace in the core area.

<sup>6</sup> Related models, though without social standards, can be found in Sinn (2000) and Sinn and Sinn (1991, chapter 5).

Nevertheless, people typically do not want to migrate. They prefer to stay at home and migrate only if the reward in terms of a wage increase is sufficiently high. Let  $X$  stand for the number of guest workers who have migrated to the core area. Since they prefer to live at home in principle, they face an aggregate cost  $\psi(X)$  when they live and work in the core area, which measures both the subjective aversion against doing so and the objective costs involved.  $\psi(X)$  does not represent a one-off migration cost. Instead, it refers to the recurring costs associated with staying in the other country. Examples of the objective costs are the costs of 'commuting' or of regular trips home, and of having to pay larger rents than at home. An example of the subjective cost is homesickness. Some guest workers have a low preference for their home country and do not go back there very often; for others the situation is the reverse.  $\psi(X)$  with  $\psi(0) = 0$  and  $\psi'(X) > 0$  describes the aggregate costs of all guest workers staying in the core country as a function of their number. Since the guest workers differ and are ranked in the order of their individual cost  $\psi'$ , where the first one is assumed to have no cost, it follows that  $\psi'(0) = 0$  and  $\psi'' > 0$ .

Because free transfer of knowledge is assumed, the joining country produces its goods with the same linearly homogeneous, strictly quasi-concave production function  $f(K, L)$  as the core area does, where real capital  $K$  and labour  $L$  are the factors of production. The constant labour force potential of the joining country is  $L^*$ , and the number of guest workers sent abroad is

$$X = L^* - L. \quad (4.1)$$

A worker can work for a fixed effective wage rate  $w^*$  in the core area or for an effective wage rate of  $w$  at home. The star is chosen here as the index for the labour force potential of the joining country and the wage rate of the core country, because these two values will turn out to characterize the steady state values of employment and the wage rate in the joining country. Workers with a high home country preference,  $\psi'(X) > w^* - w$ , stay at home because the wage differential is not sufficient to compensate them for the cost of working in the core area. The reverse holds for those workers who have only a low preference for staying at home, for whom  $\psi' < w^* - w$ ; they decide to be guest workers. The marginal worker who is just indifferent between migrating and staying at home, because the wage gap balances his home preference, is implicitly defined by the condition

$$\psi'(X) = w^* - w. \quad (4.2)$$

The effective wage rate  $w$  which drives the migration decision is the worker's subjective money equivalent of a benefit bundle consisting of the pecuniary market wage  $w_p$  and the benefit resulting from firms' expense per employee,  $w_s$ , necessary to meet the government-determined social standard,

$$w \equiv U(w_p, w_s). \quad (4.3)$$

It is assumed that the derivatives satisfy the assumptions  $U_1, U_2 > 0$ ,  $U_{11}, U_{22} < 0$ . Similarly,  $w^*$ , the given effective wage rate in the core area, is the subjective money equivalent of the direct and indirect wage elements available there.  $U$  is linearly homogeneous and normalized in a way that

$$U(w_p, w_s) = w_p + w_s$$

$$\text{if } w_p \text{ and } w_s \text{ are chosen such that } U_1 = U_2 = 1. \quad (4.4)$$

To include a rationale for why social standards are chosen by governments rather than the firms themselves, a basic information asymmetry between workers and firms, which gives rise to a lemons problem, can be assumed. While each firm knows its expense for its own measures to improve the quality of its workplaces, workers have a more limited knowledge when they make their employment decisions. They know the country average, but not the efforts of their future employers at the time they sign their employment contracts. Thus, each single firm has an incentive to underinvest in the quality of its own workplaces. If it does so, it saves costs, but will not, or not immediately, be punished by not being able to attract or keep workers. To prevent an equilibrium in the labour market where the quality of workplaces is inefficiently low, the government imposes the right social standard as a binding constraint on firms' choices.

Alternatively, it can be assumed that there is no information asymmetry between workers and firms, but governments become active simply because the complicated definition of workplace standards is a public good whose production is costly so that it is cheaper to have the government set the standards than to rely on each single firm doing this separately.

It is debatable whether the information asymmetry, if there is one at all, carries over to the choice between countries. Certainly it is much easier to acquire the information about countries than about individual firms. Thus the assumption that workers know the country-specific social standards when they make their migration decisions seems reasonable. A Pole who migrates to Germany knows under which conditions he has worked in Poland and has quite accurate expectations about the social standards prevailing in Germany. Chapter 6 will study a lemons problem in the market for consumer goods where it seems much more plausible to assume that the agents are insufficiently informed about the country standards, because they have to deal with a large number of countries at the same time.

Let  $t$  indicate calendar time. Unless otherwise indicated all equations hold for all points in time,  $t > 0$ , where zero is the time of joining the union. Variables like  $X$ ,  $L$ , or  $w$  are time-dependent magnitudes. It is assumed that no migration is possible before the time of joining the core area and that, in the joining country, the marginal product with full employment is below the wage rate in the core area because the initial stock of capital,  $K_0$ , is sufficiently low:

$$\begin{aligned} X(t) &= 0, \quad \psi'[X(t)] = 0, \\ w^* - f_L(K_0, L^*) &> 0, \\ \text{for } t &\leq 0. \end{aligned} \quad (4.5)$$

A rational expectations equilibrium is modelled, because the national government or a supra-national government like the EU cannot be assumed to have better foresight than the participants in the market. The representative firm in the joining country takes the rate of interest and the time path of the pecuniary wage as given, and in equilibrium this anticipated time path equals the actual one. The firm also knows the time path of the government-imposed social standard, and at each point in time it spends the amount of money per worker,  $w_s$ , necessary to meet the then-prevailing standard. The firm chooses the time paths of its labour use,  $L$ , and its net investment,  $I$ , such that the present value of the cash flow it generates is maximized:<sup>7</sup>

<sup>7</sup> The formulation leaves open whether investment is financed by equity or loan capital. Because taxes are not discriminatory the two ways of financing it are equivalent.

$$\begin{aligned} \max_{\{L, I\}_{0}^{\infty}} & \int_0^{\infty} \{f[K(t), L(t)] - [w_p(t) + w_s(t)]L(t) - I(t) - \phi[I(t)]\} e^{-rt} dt \\ \text{s.t.} & \\ K(0) &= K_0 = \text{const.}, \\ \dot{K} &= I. \end{aligned} \quad (4.6)$$

The current-value Hamiltonian of this problem is

$$H = f(K, L) - (w_p + w_s)L - I - \phi(I) + qI,$$

where  $q$  is the co-state variable of the stock of capital, i.e. Tobin's  $q$ .

Applying Pontryagin's Maximum Principle, the first-order conditions

$$\frac{\partial H}{\partial L} = f_L - w_p - w_s = 0 \quad (4.7)$$

and

$$\frac{\partial H}{\partial I} = -1 - \phi'(I) + q = 0, \quad (4.8)$$

the canonical equation

$$\dot{q} - rq = -f_K \quad (4.9)$$

and the transversality condition

$$\lim_{t \rightarrow \infty} q(t) K(t) e^{-rt} = 0 \quad (4.10)$$

can be derived.

## THE POLICY OF THE NATIONAL GOVERNMENT

From the equations set up in the previous section, the government knows how migrants and private firms will react to the time path of the standard it announces and which intertemporal equilibrium will therefore emerge. Thus it effectively chooses the time path of the

firms' corresponding expense per worker,  $w_s$ , so as to maximize national welfare. In the present context, national welfare,  $W$ , is the sum of the present value of the representative firm's cash flow according to (4.6) and the present value of the money equivalents of the direct and indirect wage benefits earned at home,  $U(w_p + w_s) \cdot L$ , and abroad,  $w^* \cdot (L^* - L)$ , minus the migration cost  $\psi(L^* - L)$ .<sup>8</sup>

$$W = \int_0^\infty \left\{ f[K(t), L(t)] - [w_p(t) + w_s(t)] L(t) - I(t) - \phi[I(t)] \right\} e^{-rt} dt + \int_0^\infty \left\{ U[w_p(t), w_s(t)] L(t) + w^* \cdot [L^* - L(t)] - \psi[L^* - L(t)] \right\} e^{-rt} dt \quad (4.11)$$

The constraints of the government's optimization include the migration rule (4.2) and the firms' optimality conditions (4.7)–(4.9).

Consider the effect on  $W$  of a marginal perturbation  $\epsilon(t)$  of the time path of  $w_s$ . This perturbation incurs a first-order effect and a second-order effect on national welfare. The latter results from the general equilibrium reactions of the time paths of  $I$  and  $L$ , given the time paths of the direct and indirect wage components  $w_p$  and  $w_s$ . It is zero since the marginal perturbation takes place around the private optima. None of the two integrals in (4.11) takes on a different value.<sup>9</sup>

The first-order effect results from the changes in the direct and indirect wage components, given the behaviour of private agents as described by  $L$  and  $I$ . The relationship between these two wage components is given by (4.7), which, as  $L$  is given, obviously implies that  $\partial w_p / \partial w_s = -1$ ; i.e. that the cost of the standard crowds out the pecuniary market wage on a one-to-one basis. If the government has optimized

<sup>8</sup> It could be argued that the return to capital earned by foreign investors which has to be financed out of the output produced in the joining area would have to be subtracted in the welfare calculation. However, if this is done, it is also necessary to add the funds flowing in at the time of investment. As the present value of the total cash flow between the joining country and its foreign investors is zero, this amendment of the equation would not affect the results. In fact, discounting with the rate of return in the core area,  $r$ , already correctly expresses the joining country's funding cost.

<sup>9</sup> Note, for example, that the derivative of the integrand of the second integral with regard to  $L$  is zero because of the marginal migration condition (4.2).

its policy, this perturbation is unable to change welfare. Thus it is a necessary condition for an optimum that

$$\Delta W \Big|_{\{L, I\}} = \int_0^\infty \epsilon(t) [U_2(w_p(t), w_s(t)) - U_1(w_p(t), w_s(t))] e^{-rt} dt = 0,$$

where, as before,  $U_1$  and  $U_2$  are the derivatives of the workers' utility function. Since this condition must hold for arbitrary perturbations  $\epsilon(t)$ , it is also necessary that the marginal rate of substitution between the two wage components is always one:

$$\frac{U_1(w_p, w_s)}{U_2(w_p, w_s)} = 1 \quad \forall t \geq 0. \quad (4.12)$$

Because of the linear homogeneity of the utility function this optimality implies that the government-imposed workplace standard will improve gradually in step with a rise in the market wage. Because of the normalization of the utility function assumed with (4.4), equation (4.12) implies that the utility from having a job in the domestic economy, which above was called the effective wage, can simply be taken to be the algebraic sum of the wage paid out to the workers and the per-capita expense involved by satisfying the government-imposed work standard:

$$w = w_p + w_s. \quad (4.13)$$

If the government did not satisfy equation (4.12), the effective wage would be lower than this sum, because an excess burden from setting non-optimal social standards would have to be subtracted.

**Proposition 4.1:** *Maximizing social welfare, the government of the joining country chooses a time path of the social standard such that the rate of substitution between the pecuniary wage and the firms' expenses necessary to satisfy the standard is equal to one.*

## THE OVERALL WELFARE OPTIMUM

After studying the optimality conditions of private agents and the national government, a supra-national perspective will now be taken to check whether the accusation of social dumping is justified. Consider

the optimization problem of a benevolent supra-national social planner. If the result of his optimization problem does not differ from the outcome of the previous two sections, there is no reason to intervene by harmonizing social standards or similar measures. If it does, supra-national actions may be considered.

From an international perspective, the welfare goal does not differ from the national one as long as it can be assumed that the term  $w^* \cdot [L^* - L(t)] - \psi[L^* - L(t)]$  correctly measures the social benefit from sending guest workers to the core country. Such an assumption is justified because  $w^*$  equals the fixed marginal product of labour in the core country minus a potential excess burden from setting sub-optimal work standards. Thus the overall social optimum can be found by solving the problem

$$\max_{\{L, I, w_p, w_s\}_0^\infty} W, \text{ s.t. } K(0) = K_0 = \text{const. and } \dot{K} = I,$$

where  $W$  is defined as in (4.11). The current-value Hamiltonian for this problem is

$$H = f(K, L) - I - \phi(I) - (w_p + w_s - U(w_p, w_s)) \cdot L + w^* \cdot (L^* - L) - \psi(L^* - L) + qI.$$

The term  $(w_p + w_s - U(w_p, w_s))$  is the per capita excess burden from a non-optimal choice of social standards and  $q$  is again the co-state variable of the stock of capital,  $K$ . The necessary conditions for a maximum of the Hamiltonian are

$$\frac{\partial H}{\partial L} = f_L - [(w_p + w_s) - U(w_p, w_s)] - w^* + \psi' = 0, \quad (4.14)$$

$$\frac{\partial H}{\partial I} = -1 - \phi'(I) + q = 0, \quad (4.15)$$

$$\frac{\partial H}{\partial w_p} = (-1 + U_1^L) = 0, \quad (4.16)$$

$$\frac{\partial H}{\partial w_s} = (-1 + U_2^L) = 0, \quad (4.17)$$

and the canonical equation is

$$\dot{q} - rq = -f_K. \quad (4.18)$$

The transversality condition of this problem is

$$\lim_{t \rightarrow \infty} q(t) K(t) e^{-rt} = 0. \quad (4.19)$$

Equations (4.16) and (4.17) coincide with the national optimum as defined by (4.12) and (4.13) with regard to the work standard policy. Thus the term in squared brackets in (4.14) disappears, and obviously the other marginal conditions coincide with conditions (4.7)–(4.10) which characterize a market equilibrium.

**Proposition 4.2:** *The transformation process chosen by market forces and the work standard policy chosen by the joining country's government are efficient from a supra-national perspective.*

If the national choices were not efficient, a supra-national agency such as the EU would have to think about potential remedies including the frequently demanded harmonization of social standards. However, proposition 4.2 confirms that this is not necessary. Since the decentralized solution including the decentralized choice of government actions leads to a first-best optimum, there is no social dumping and no need for centralized government actions. Systems competition with workplace standards works even though systems competition with public redistribution does not.

The social optimality of the national government's choice is even warranted in a second-best sense, when the core area itself sets a non-optimal standard, because a potential excess burden from having a wrong policy in the core area was taken into account. Nevertheless, it will be assumed in the following sections that the core area's governments have also chosen optimal social standards according to the same utility function relevant in the joining countries. In this case, there is no excess burden in the core area, and the effective wage there,  $w^*$ , equals the marginal product of labour in the core area.

## THE PROPERTIES OF THE CATCHING-UP PROCESS

While the above analysis has clarified a number of normative policy issues, it has not yet explored the positive implications of the model set up. Suppose the government of the joining country chooses the optimal time path of social standards, firms optimize their employment and investment decisions and households optimize their migration decisions. Which transition path will be taken by a lesser developed, catching-up country joining a well-developed core region like the EU?

Applying (4.8) or (4.15), a central differential equation for the growth of private investment over time follows from (4.9) or (4.18):

$$\dot{I} = \frac{r[1 + \phi'(I)] - f_K(K, L)}{\phi''(I)}. \quad (4.20)$$

It follows from equations (4.1), (4.2), (4.7) and (4.13) that

$$w = f_L(K, L) = w^* - \psi'(L^* - L) \quad (4.21)$$

which implies a functional relation of the type

$$L = \phi(K) \quad (4.22)$$

between capital and employment, where

$$\phi'(K) = \frac{f_{LK}}{\psi'' - f_{LL}} > 0 \quad (4.23)$$

follows from an implicit differentiation of (4.21) and the assumptions on the functional forms made above.

This indicates that if there is capital investment in the joining country, employment will increase. As assumed with (4.5), the joining country is undercapitalized and has a low marginal productivity of labour, and, as indicated by (4.20), the stock of capital cannot adjust instantaneously after joining, but only gradually with the passage of time. It thus follows from (4.21) that there will be an immediate

outward migration of guest workers and that the resulting initial wage rate and marginal product of labour of the joining country will be *below* the effective wage rate and marginal product of labour in the core area by the marginal cost of living there. Analogously, the marginal product of capital in the joining country will be above that in the core area if the two countries have the same factor price frontiers (free transfer of knowledge). Assume that the marginal product of capital in the core area is equal to the rate of interest  $r$  because the adjustment of the capital stock has already been completed there.

If capital is being accumulated after this initial adjustment, this will change the factor prices. From (4.21)–(4.23) it is possible to establish that the marginal product of labour increases,

$$\frac{df_L[K, \phi(K)]}{dK} = \psi'' \cdot \phi' > 0,$$

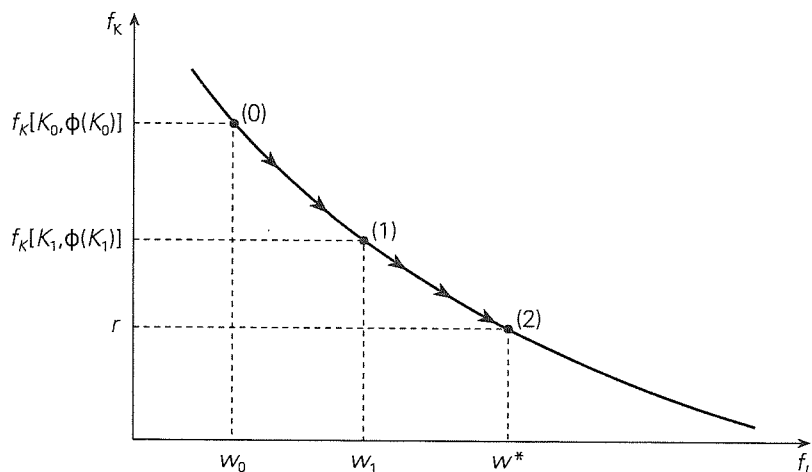
and because of the negative slope of the factor price frontier the marginal product of capital declines:

$$\frac{df_K[K, \phi(K)]}{dK} < 0.$$

Let  $K^*$  be the capital stock at which the marginal product of labour in the joining country would be equal to the wage rate in the core area:  $f_L[K^*, \phi(K^*)] \equiv w^*$ . The fact that the two regions have the same factor price frontiers then implies that the joining country's marginal product of capital approaches the common interest rate  $r$  if  $K$  increases to  $K^*$ :

$$f_K[K^*, \phi(K^*)] = r.$$

Figure 4.2 explains these relationships by showing the joining country's movement along the factor price frontier. Before people migrate, and before the equilibrium described above is produced, capital intensity in the joining area is very low. Point (0) gives the values of the effective wage rate and the marginal product of capital associated with this. The spontaneous migration of guest workers that occurs immediately after joining leads to a jump along the factor price frontier from (0) to (1).



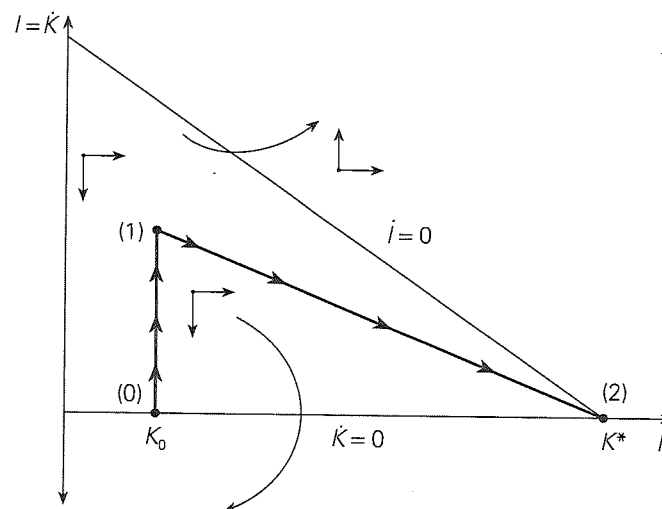
**Figure 4.2** Factor price equalization between the joining region and the core region.

Provided that capital subsequently flows into the joining country, there will be a subsequent gradual movement from point (1) to point (2) on the factor price frontier, where point (2) is characterized by the critical level of capital,  $K^*$ , at which the factor prices in the core region and the joining area are equal.

The movement from (1) to (2) takes place if the stock of capital increases. How it increases can be derived from the differential equation (4.20) which, by applying (4.22), can also be written as

$$\dot{I} = \frac{r[1 + \phi'(I)] - f_K[K, \phi(K)]}{\phi''(I)}. \quad (4.24)$$

The implications of this differential equation, combined with the definitional differential equation  $\dot{K} = I$ , are shown in figure 4.3. The figure includes all time paths which are compatible with (4.24). The  $\dot{I} = 0$  curve shows those combinations of  $I$  and  $K$  for which the numerator of (4.24) is zero. The curve divides the figure into two areas, where movements are in different directions as shown by the arrows. Some paths cut the  $\dot{I} = 0$  curve horizontally, others meet the abscissa vertically. Just one path, the stable branch, leads to the point with the coordinates  $(I = 0, K = K^*)$ . Only this path can characterize the market equilibrium.



**Figure 4.3** Investment and capital in the adjustment process.

Paths above the stable branch indicate positive and increasing investment up to the point where  $K = K^*$ . Since the marginal product of capital will then be equal to the market rate of interest, further investment would be unable to bear any adjustment cost. However, the positive level of investment characterizing paths above the stable branch implies such cost. This contradiction rules out the possibility that such paths could characterize a market equilibrium.

Paths below the stable branch will eventually cut the abscissa from above before the marginal product of capital is equal to the market rate of interest. After this, the capital stock will shrink at an increasing speed and become zero in finite time so that the policy described by (4.24) becomes infeasible.

On the stable branch, the level of investment shrinks to zero as  $K$  approaches  $K^*$ . Thus  $K^*$  will not be reached in finite time, but the economy converges to this capital stock as time goes to infinity. It follows from (4.15) and (4.18) that the co-state variable, Tobin's  $q$ , is greater than one on the stable branch and converges to one as time goes to infinity. Thus it is clear that the transversality conditions (4.10) and (4.19) are met. All the necessary conditions for a welfare optimum and an optimum in the market agents' planning problem are satisfied.

The optimal adjustment strategy after integration into the common capital and labour markets is shown in figure 4.3 by a rapid increase in

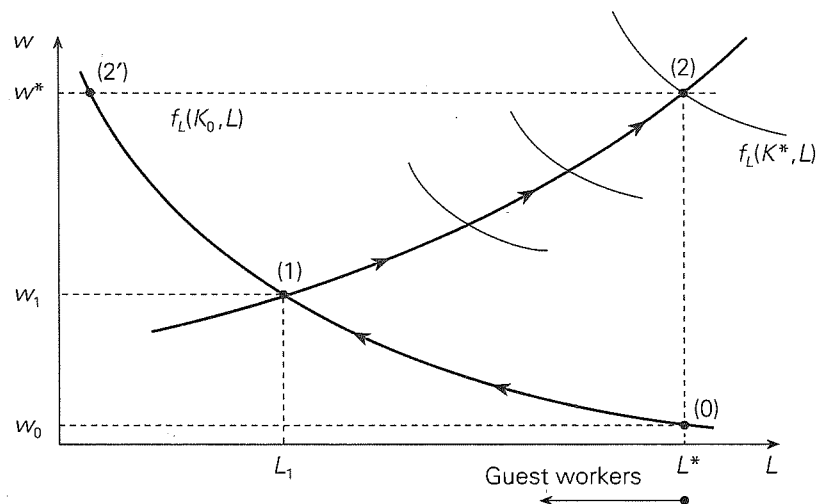


Figure 4.4 The adjustment of the labour market.

investment from (0) to (1) and a gradual development from (1) to (2). In this gradual development process investment is at first very high and then becomes successively smaller. The capital stock, and with it the whole economy, thus initially grows at a very high rate and then at a gradually falling rate towards the value  $K^*$ , which characterizes complete factor price equalization.

Finally, to round off the overview, it is useful to take a look at figure 4.4.<sup>10</sup> The development path of the joining country is shown there in a labour market diagram with supply and demand curves. At the time of joining, and before people and capital migrate, point (0) on the demand curve  $f_L(K_0, L)$  is realized. The effective wage rate  $w_0$  is low enough to ensure full employment of the labour force potential  $L^*$ . This point is not an equilibrium when the borders are open, because

<sup>10</sup> The figure must be interpreted only qualitatively. For clarity of presentation the number of guest workers ( $L^* - L$ ) is very much exaggerated in the figure. If the 'joining country' can be taken to be the set of ten east European countries applying for EU membership, an emigration in the order of 5–7% or 5–7 million people can be expected if all east European countries including Romania and Bulgaria join. See Sinn et al. (2001).

the wage difference with the core area exceeds the marginal migration cost which is zero when no one migrates. In accordance with the assumptions made, people are quick but unwilling and capital is slow but willing. Therefore there is initially an instantaneous jump along the old demand for labour curve up to point (1) where this curve is cut by the supply curve. The supply curve shows the number of workers in the reverse order of their reservation wage. The reservation wage is the effective wage rate in the core area,  $w^*$ , minus the individual cost of staying in the home country,  $\psi'$ . The realization of point (1) means that initially  $L^* - L_1$  people migrate to the core area as guest workers and that the same number of (less productive) jobs in the joining country are lost.

After point (1) is reached capital accumulation makes itself felt in the form of a gradual rightward shift of the demand for labour curve towards position  $f_L(K^*, L)$ . The market equilibrium point moves out from (1) gradually, but with diminishing speed, along the labour supply curve towards point (2). In the course of this gradual adjustment process, the number of guest workers falls until they all have returned home again, and the effective wage rate rises until it reaches the effective wage rate in the core area,  $w^*$ . Thus, there is only a temporary population shift from the joining country to the core area, and not a permanent one. At first, there is a rapid wave of out-migration but, over time, when wages rise as the capital stock increases, return migration to the home country takes place. This two-sided migration pattern is typical for guest worker migration flows from countries in transition.

Recall that this process incorporates not only private market decisions, but also the decisions of the national government in that this government gradually redefines the social standard for employment contracts. According to assumptions (4.3) and (4.4), in the national optimum as given by (4.12), both components of the effective wage rate  $w^*$ , the pecuniary wage  $w_p$  and the non-pecuniary wage resulting from the firms' social expenses  $w_s$ , rise in step during the adjustment from point (1) to point (2). As it was assumed in addition that the governments in the core area have optimized their social policies, reaching point (2) also implies that both wage components converge towards the respective values in the core area. Eventually, the joining country's government will impose the same social standards as the governments of the core area do.

The following proposition summarizes the positive implications of the model.

**Proposition 4.3:** *Opening the borders between a lesser developed joining country and a well-developed core area results in a convergence process with two-sided labour migration. In the short term with an initially given capital stock, some of the working population of the joining country migrate as guest workers to the core area. In the joining country, this reduces the labour supply, increases wages, destroys the less productive jobs and induces the national government to raise the social standard in step with the wages. Because interest rates are the same in both regions and because the subjective and objective costs of migration mean that wage equalization cannot happen in the short run, the joining country attracts an inflow of capital from the core area. The inflow of capital increases the demand for labour in the joining country and leads to a further increase in the wage rate and the social standard, which results in a gradual return migration of the guest workers. The capital inflow dries up when the market wage and the social standard have reached the respective levels in the core area and the guest workers have gone back home again.*

As the catching-up process described characterizes an intertemporal general equilibrium of both the market economy and systems competition, and since the process represents a welfare optimal growth strategy, the hypothesis of social dumping can be refuted. A government that acts in the national interest will choose the right speed of adjusting the country's social standards to the level prevailing in the core area. Wages and government imposed work standards will be lower than in the core area during a long transition period before an adequate capital stock has been accumulated, and in the long run they are adjusted without the need for supra-national intervention measures. The temporary lag in wages and social standards has nothing at all to do with social dumping; it is the result of the efficient working of the Invisible Hand in systems competition.

## LESSONS FROM GERMAN UNIFICATION

The adjustment problem just described is extremely important for the development of the European Union, for the eastern enlargement

involves the entry of countries whose economies are still very backward compared to those of the core countries. Because wage costs in the new member countries are extremely low (between 10% and 15% of those in west Germany), the political pressure for a harmonization of wages and social standards is increasing in the core countries.

The practical example of German unification shows how dangerous such a policy would be. Following unification, Germany learned the painful way that the laws of the market cannot be ignored. In anticipation of a wonderful future, the policy of early equalization of wages and social standards was given the go-ahead and the economies of the new Länder were led up a blind alley. Social standards were adjusted immediately after unification, and the hourly wage costs in east German manufacturing jumped to more than 70% of the western level in only five years, although they were only 7% of this level before unification at the then prevailing exchange rate. The consequence of this explosion of the labour cost was a loss of competitiveness which destroyed nearly 80% of the jobs in manufacturing. Mass unemployment and a westward net migration of around 9% of the east German population resulted.

In terms of figure 4.4, the east German wage policy means that the automatic increase in wages from  $w_0$  to  $w_1$ , which would have occurred by itself as a result of westward migration and cutbacks in the east German labour market, was not waited for. Instead, there was a movement along the labour demand curve  $f_L(K_0, L)$  upwards to the left towards point (2'). The excess supply of labour shown in the figure is the present mass unemployment. Unemployment, at least as far as it was triggered off by too rapid an increase in wages and the immediate implementation of west German labour standards, is an obvious sign of misallocation, a waste of valuable working time, and an irrecoverable loss of national output.

Germany has had to pay for the misallocation with massive social transfers to the new Länder. In the first decade after unification, net eastern transfers amounted to €750bn and the government debt more than doubled. At the time of writing, west Germany is still transferring 4.5% of its GDP via the public budget to east Germany. The European Union cannot permit itself to make such an expensive policy mistake.

Fortunately, the German policy mistake is not likely to be repeated at the European level, because first, people can learn and second, the special policy mechanisms that were responsible for wage policies in Germany do not extend to the European level. The German problem

was that the western trade unions and the western employers negotiated the east German wages among themselves – there were no east German firms in existence at the time (spring 1991) the critical wage decisions were made.<sup>11</sup> There were proxy negotiations in which both of the ‘negotiating parties’ had the same interest in high east German wages because they wanted to avoid unpalatable competition in their own west German branches of industry. Similarly, western employers and union representatives helped convince the government to impose west German work standards and the west German social security system on the east Germans right from the beginning. Circumstances like these can, in principle, be ruled out for the EU accession countries because negotiations there will take place between national trade unions and national employers. This will ensure that the negotiating parties represent opposing interests with regard to wage policies. Also, it is hard to imagine that the governments of the accession countries will come under pressure from the employers’ and employees’ representatives of the core countries. Thus it is very likely that these countries will approximate the optimum described above more than east Germany was able to do.

### WHY LOW WAGES AND SOCIAL STANDARDS DO NOT INDICATE SOCIAL DUMPING

The accusation of social dumping, which the catching-up European countries seem to have engaged in because their wages and social standards are low, is not justified. Low wages, low social standards and high returns to capital are the necessary concomitants of a long-term adjustment process. Even in a common European economy without artificial barriers to factor movements there are natural barriers large enough to slow down the process of factor price equalization for a long time, and the governments of the joining countries will take this into account when they define the speed with which they adjust social standards to those in the developed core areas. In allocative terms, it is a mistake to want to overcome these barriers with counteracting policy measures. It would be particularly mistaken to attempt to enforce the equalization of social standards appropriate for the long run by means

of premature harmonization. Such an attempt would only reproduce the east German debacle on the EU level.

Left to themselves, decentralized choices of households, firms and national governments will solve the adjustment problem of a relatively underdeveloped joining country in that some of the labour force potential will move to the core area as guest workers. This will then lead to spontaneous increases in wages and a parallel adjustment in social standards in the joining countries which will reduce the pressure to migrate. As the effective wage level will still be well below that of the core area despite the spontaneous increase, there will be an import of capital and this will successively raise labour productivity, wages and social standards. To the extent that the increase in effective wages results in a closure of the wage gap, it reduces the incentive for investment and thus prevents a further increase in effective wages. Wages and social standards will equalize in the long run. The mistrust of the allocative efficiency of systems competition is not justified. The lag in wages and non-wage benefits in the still lesser developed countries is the key characteristic of an efficient transformation and convergence process.

A simple but important insight for the assessment of systems competition follows from this. Because private competition and systems competition carry out the gradual transformation of the joining country perfectly, there is no need for a supra-national government like the EU to intervene by harmonizing social standards. Both the EU Social Charter and the ILO conventions are interventions of dubious use.

<sup>11</sup> See Sinn and Sinn (1991).

## Ecological Competition

### ECOLOGICAL DUMPING OR EXCESSIVELY GREEN POLICIES?

The connection between a country's competitiveness and its environmental policy has been central to the political debate in recent years. Time and again, economy and ecology have been thought of as conflicting elements which are very difficult to reconcile in an open economy trying to hold its ground in international competition. From the business community, there have been warnings about too extreme environmental policies because these are thought to be detrimental to domestic competitiveness.

Green parties, on the other hand, voice warnings about ecological dumping which can result from intensive systems competition. The problem of global warming, cross-border hazards from nuclear power stations, dying forests, the pollution of common water pools, hazards from rusty tanker fleets and many other environmental problems are attributed to the inability of the current world economic order to appropriately care for nature's resources.

In the academic literature opinions are also divided about whether fiercer systems competition is compatible with environmental policy goals. On one hand, there are pessimistic studies, dating back to Cumberland (1979), which deny that there can be a functioning systems competition in the area of environmental policy and which tend to confirm the Green fears. On the other hand, approaches in the literature based on theoretical models tend to be optimistic. Long and

Siebert (1991) argue that states using Pigovian taxes have adequate incentives to protect the environment, and Oates and Schwab (1988) derive a similar result for the case of an environmental policy based on quantity standards.

This discussion will be taken up again in what follows, but the workability of ecological systems competition will be investigated under alternative sets of assumptions about international policy externalities. The analysis will begin with the case where such externalities are absent, move to the case of physical spillover effects between the countries, and then focus on rent dissipation effects resulting from cross-border ownership in firms whose waste emissions are regulated by the government. The point to be discussed is that, except in the case of Pigovian taxes, environmental policy will generally affect the size of rents or quasi-rents which firms earn by being able to use the environment as a factor of production. To the extent that these rents flow to foreigners and are affected by environmental policies, the national government may have distorted incentives in making its policies. In general, this chapter will show that an optimistic view about systems competition is not justified and that the distortions do not always go in the direction of ecological dumping.

### CONDITIONS FOR A FUNCTIONING ECOLOGICAL COMPETITION

The analysis starts by presenting a basic model in which many of the relevant problems are ignored and which permits an optimistic judgement about 'ecological competition' to be made. This model will be a useful benchmark for understanding the distortions that arise under more realistic conditions.

A small open economy is considered which is linked to the rest of the world through a perfect mobility of capital and goods. The rate of return to financial capital,  $r$ , is given in the rest of the world, and all equity capital, if any, is owned by domestic residents. The factor labour,  $L$ , is immobile internationally. Industrial production results in the emission of environmental waste, but this waste settles exclusively within the national boundaries. No physical spillovers to other countries occur. An ecological or Pigovian tax at the rate  $p$  per unit of waste emissions is used to regulate the emission. The competitive firms produce a homogeneous good with a linearly homogeneous

production function,  $f(L, S, K)$ , with the usual characteristics where  $S$  is the waste emission and  $K$  is the capital used. The emission is treated as a factor of production like labour and capital because increasing it allows production to be increased and/or less of the other factors of production to be used.<sup>1</sup> The firms maximize their profits with given prices for labour,  $w$ , environmental waste,  $p$ , and capital,  $r$ ,

$$\max_{L, S, K} f(L, S, K) - wL - pS - rK, \quad (5.1)$$

which implies the usual input rules

$$f_L = w, \quad f_S = p, \quad f_K = r. \quad (5.2)$$

The output price of the internationally traded good is standardized to a value of one in all countries; the wage rate is given endogenously by the requirement that the labour market clears with the fixed supply of labour; the Pigovian tax rate  $p$  is set by the government; and the rate of return to capital is, as mentioned, given internationally. The households receive transfers equal to the revenue from the Pigovian tax,

$$T = pS, \quad (5.3)$$

and they earn a wage income  $wL$  and a capital income  $r\bar{K}$ , where  $\bar{K}$  is their given amount of overall wealth.  $\bar{K} - K$  is the country's net foreign wealth position. The utility  $U(Y, S^*)$  of the representative household is an increasing function of its income

$$Y \equiv wL + T + r\bar{K} \quad (5.4)$$

and a decreasing function of the pollution or waste immission  $S^*$ . For the time being it is assumed that immissions and emissions in each of the countries are equal, because waste cannot spill over to other countries:

$$S^* = S. \quad (5.5)$$

<sup>1</sup> An economic factor is an entrepreneurial activity which creates costs elsewhere and an economic good is an activity which creates benefits elsewhere. In a market equilibrium the factor is paid by the firm and the firm is paid for the good. That is why the firm produces at the place on its technical production possibility curve where tolerating a little more of the activities which elsewhere create costs opens more scope for those activities which elsewhere create benefits. In short, this is why factors are productive.

Later, this assumption will be relaxed by allowing for spillovers, and there will be strong behavioural implications. Nevertheless, in equilibrium it will still be true that immissions and emissions are equal, because a symmetry between the countries will be assumed.

The government regulates the environment by choosing the Pigovian tax rate. It acts on the instructions of the households which control its behaviour by voting collectively in an election in a way that maximizes their own utility. In contrast to maximizing utility by means of market decisions, maximizing utility by means of a collective political decision has to take account of the endogeneity of the wage rate. When the factor price exhaustion theorem is taken into account, the sum of the wages income and the Pigovian tax revenue will equal the domestic product  $Y$  that remains after deducting the return to capital,

$$wL + pS = f(L, S, K) - f_K \cdot K \quad (5.6)$$

and, taking account of (5.2) and (5.3), equation (5.4) then becomes

$$Y = f(L, S, K) + r(\bar{K} - K). \quad (5.7)$$

Thus, the income of domestic residents equals domestic output plus the return on capital earned abroad; i.e. it equals the country's national product. The government is faced with the task of maximizing its citizens' utility  $U$ , which is a function of national income and pollution:

$$\begin{aligned} \max_s U(Y, S^*) \\ \text{s.t. (5.2), (5.5) and (5.7).} \end{aligned} \quad (5.8)$$

Regardless of a possible endogenous reaction by  $K$  to a variation in  $S$ , which satisfies the constraint that the marginal product of capital is kept in balance with the given world-wide rate of return to capital, (5.8) implies the marginal condition

$$p = f_S = - \frac{U_{S^*}}{U_Y} \equiv \frac{dY}{dS^*} \bigg|_U. \quad (5.9)$$

This requires the marginal product of waste emission, which because of (5.2) is equal to the Pigovian tax rate, to be equal to the marginal environmental damage as judged by the citizens. Figure 5.1 illustrates

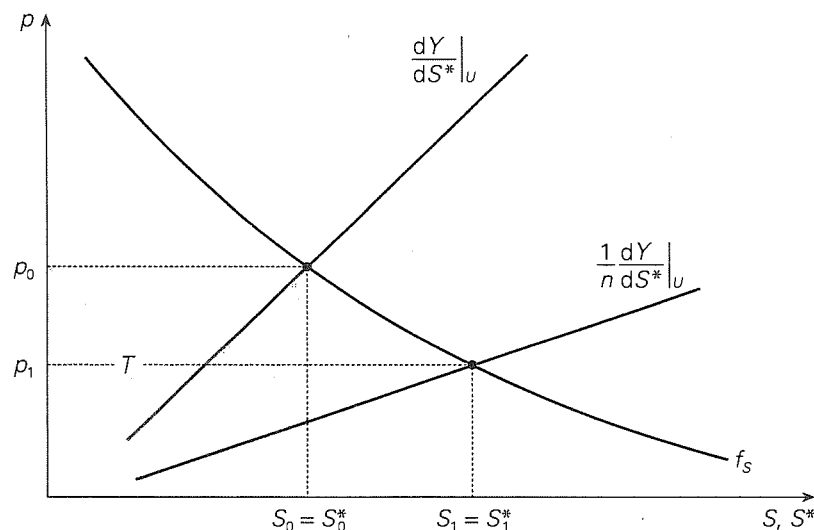


Figure 5.1 The optimal Pigovian tax rate.

this result.  $S_0^*$ ,  $S_0$ , and  $p_0$  are the optimal values for  $S^*$ ,  $S$  and  $p$ , and the shaded area measures the Pigovian tax revenue  $T$ .

The optimal environmental policy determined this way is the national optimum of a closed economy, given that Pigovian taxes are used to regulate the pollution and given that the government maximizes the sum of all national rents. However, the policy is optimal in other respects, too.

First, it is a first-best national welfare optimum regardless of how the government controls the environment. A benevolent national planner who is not constrained to use Pigovian taxes and can command the allocation of resources directly would want to maximize the same utility function as used in (5.8), would define national income as in (5.7) and of course would have to respect the technological constraint (5.5). However, he would not have to respect the profit maximization constraint  $f_S = p$  from (5.2). Nevertheless, he would choose the stock of capital and the environmental policy such that  $f_K = r$  and  $f_S = -U_{S^*}/U_Y$  as in (5.9).

Second, the policy is also optimal from the viewpoint of all countries combined. A benevolent supra-national central planner would allocate the capital to the different countries so as to maximize aggregate income. Thus he would equate all marginal products of capital,

attaining the same allocation as is implied by all countries following the rule  $f_K = r$ . Moreover, due to the absence of international spillover effects, he would choose each country's environmental policy so as to maximize national utility given the optimal stock of capital, and again this would be the same pollution as defined by (5.9).

Thus, nothing can be gained by coordinating environmental policies internationally. The regulation decision taken in the national interest already leads to a balance between the marginal product of waste emissions and the marginal damage caused to the environment as judged by the citizens. It is not rational for a country that competes internationally for mobile capital not to have a 'green' policy and there is also no need to fear that systems competition will lead to ecological dumping. This is essentially the result that Long and Siebert (1991) derived in a different model.

**Proposition 5.1:** *As long as the environmental damage only occurs within the country's borders and is regulated by means of a Pigovian tax, the national government has no incentive to engage in ecological dumping and also will not choose excessively green policies that hurt domestic competitiveness. Its environmental policy is efficient both from a broader national perspective, where the policy tools are not constrained, and from a common international perspective.*

Whether this result holds when the very strict assumptions are relaxed must now be investigated.

## ECOLOGICAL DUMPING WITH INTERNATIONAL SPILLOVER EFFECTS

A particularly strong and unrealistic assumption which underlies the optimistic result of the last section relates to the regional distribution of pollution. It was assumed that the waste stays within the country's borders and is not spread by wind and water to other countries. This corresponds to reality only in the very smallest number of cases. Norway's forests are damaged by Britain's emissions, French nuclear power stations endanger German districts on the upper Rhine, and part of the Thuringian Forest is being destroyed by the emissions from the Czech brown coal power stations. The Dutch drink the salty

effluents from French potash mines, and the quality of the Mediterranean and the Baltic is deteriorating because the maintenance of common property resources is being neglected. In the atmosphere, the environmental damage from the production of carbon dioxide, which results from burning oil, gas and other fossil fuels, affects the whole world. The global warming of the earth's atmosphere as a result of CO<sub>2</sub> production is considered by many scientists to be the most important environmental problem of all, but it is precisely here that the damage is least able to be restricted to the countries that cause it.

If it is assumed that one country's emission of pollution spreads evenly over  $n$  countries, then emissions and immissions are no longer equal ex ante, as they were in (5.5), but are related to one another in the following way:

$$S_i^* = \sum_{j=1}^n S_j / n, \quad i = 1, \dots, n. \quad (5.10)$$

$S_j$  is the argument of the country specific production functions as in (5.1) or (5.7), and  $S_i^*$  is, as before, the argument of the utility function of the country's representative household as in (5.8). For each individual country it again holds, as in (5.7), that:

$$Y_i = f(L_i, S_i, K_i) + r(\bar{K}_i - K_i), \quad i = 1, \dots, n, \quad (5.11)$$

but instead of (5.8) the government is now faced with the task

$$\begin{aligned} \max_{S_i} U(Y_i, S_i^*), \quad i = 1, \dots, n, \\ \text{s.t. (5.2), (5.10) and (5.11),} \end{aligned}$$

where constraint (5.5) has been replaced with (5.10).

Assuming that countries play Nash strategies with regard to their waste emissions,<sup>2</sup> the marginal condition

$$p_i = f_S(L_i, S_i, K_i) = -\frac{1}{n} \frac{U_{S^*}(Y_i, S_i^*)}{U_Y(Y_i, S_i^*)} \equiv \frac{1}{n} \frac{dY_i}{dS_i^*} \bigg|_U \quad \forall i = 1, \dots, n$$

can be derived from the optimization approach.

<sup>2</sup> The individual country optimizes its waste emission under the assumption that its behaviour has no influence on the emissions of the other countries.

This condition differs from condition (5.9) by the factor  $1/n$ , which appears in front of the expression for the marginal damage. From the point of view of the individual country, the marginal immission it suffers from is only one  $n$ th of the marginal emission it allows for by reducing its Pigovian tax rate. It is therefore optimal for it to choose a lower tax rate and a higher level of pollution than when there are no spillover effects.

The flatter of the two marginal damage curves in figure 5.1 illustrates the course of the new marginal damage function of the optimizing country, assuming a symmetrical equilibrium where all countries behave alike and each country's emissions equal its immissions.<sup>3</sup> The national optimum is now given by the values indicated by 1, that is, by the lower of the two points of intersection shown in the figure.

The solution is not a Pareto optimum from the viewpoint of all countries taken together. A Pareto optimal pollution policy follows from maximizing a country's utility with regard to its waste emission subject to the assumption that it makes sufficient side payments to all other countries so as to compensate for the damage imposed upon them. Let  $\bar{Y}_{ij}$  be the income of country  $j$  resulting from country  $j$ 's own actions and the side payments of other countries except country  $i$ . By making a side payment of size  $Y_j - \bar{Y}_{ij}$ , country  $i$  can effectively control country  $j$ 's income so as to avoid a change in country  $j$ 's welfare despite the physical spillover of waste emissions. Thus, the formal optimization problem of country  $i$  becomes:

$$\begin{aligned} \max_{S_i, Y_j} U(Y_i, S_i^*) \quad \forall j = 1, \dots, n, j \neq i, \\ \text{s.t. (5.10),} \\ Y_i = f(L_i, S_i, K_i) + r(\bar{K}_i - K_i) - \sum_{\substack{j=1 \\ j \neq i}}^n (Y_j - \bar{Y}_{ij}), \\ U(Y_j, S_j^*) = \text{const.} \end{aligned}$$

<sup>3</sup> The resulting ex post equality of emissions and immissions should not be confused with the technical equality of the two variables when there are no spillover effects. In the case at hand, the individual country can correctly assume that its emissions can be varied by its own decision independently of the immissions, even if, because of the assumption of symmetry, in equilibrium it does not behave differently from the others. In the case analysed in the previous section the country must already assume at the planning stage that varying its emissions will bring about a same sized change in its immissions. The decisive difference between the two cases shows up in the marginal calculus. In the present case, the derivative of a country's immissions with regard to its emissions is equal to  $1/n$ , in the previous case it was equal to one.

Since country  $j$ 's marginal immission requires a compensation of size

$$\left. \frac{dY_j}{dS_j^*} \right|_U = -\frac{U_{S_j}}{U_{Y_j}} \quad \forall j = 1, \dots, n, j \neq i,$$

and since country  $j$ 's marginal immission is  $1/n$  of country  $i$ 's marginal emission, the optimization approach implies the following overall marginal condition for country  $i$ 's emissions:

$$p_i = f_S(L_i, S_i, K_i) = \sum_{j=1}^n \frac{1}{n} \cdot \left. \frac{dY_j}{dS_j^*} \right|_{U_j}. \quad (5.12)$$

Equation (5.12) is the Samuelson condition for the provision of public goods. It states that the Pigovian tax rate  $p_i$  be chosen such that the marginal product of waste emissions in country  $i$  (the marginal cost of improving the environment) be equal to the sum of the marginal damages in all countries (the sum of the marginal willingness to pay for an improvement of the environment) that this country causes, where the marginal damage of country  $j$  is that country's marginal cost of immissions times its share in country  $i$ 's marginal emission,  $1/n$ .

In a symmetrical equilibrium the marginal damages in all countries are alike. It follows that it would be optimal from an international perspective to set the Pigovian tax rate such that

$$p_i = f_S(L_i, S_i, K_i) = \left. \frac{dY_i}{dS_i^*} \right|_U \quad \forall i = 1, \dots, n, \quad (5.13)$$

which is obviously the same as the single country's optimality condition (5.9) in the absence of international spillovers. Figure 5.1 demonstrates this. The international marginal damage curve which sums up the marginal damages in all countries runs the same way as the national marginal damage curve in the case without spillovers. Thus the international optimum is shown, as before, by the variables indicated by 0. The comparison with the solution characterized by variables with the subscript 1 illustrates the misallocation of a decentralized solution.

**Proposition 5.2:** *In the case of international waste spillovers, the Pareto optimal pollution policy is given by the equality between the national marginal product of the waste emission and the sum of the world-wide marginal damages that this emission causes.*

**Proposition 5.3:** *In the case of international waste spillovers, the national government will choose a too low Pigovian tax rate: that is, it will engage in ecological dumping.*

In contrast to the previous section, a pessimistic picture of the viability of systems competition in environmental issues arises. Border crossing environmental damages are negative policy externalities of national environmental policy that greatly distort the cost-benefit comparison of such a policy. The incentive to make use of the positive production effect of a lax environmental policy is stronger than the fear of environmental damage because most of this damage falls elsewhere. A single country can enrich itself at the expense of other countries by neglecting the environment, but if all countries neglect the environment, they only end up damaging themselves. Unfortunately, it does not help the individual country if it takes heed of this knowledge and departs from the equilibrium by unilaterally tightening its environmental standards. The utility in the form of an improvement in the quality of the environment is shared by all countries, but the country itself must bear the cost in the form of a reduction in output alone. Only collective actions can overcome the misallocation problem.

### POLLUTION CERTIFICATES, FOREIGN DIRECT INVESTMENT AND THE RENT DISSIPATION EFFECT

Up to now the analysis has referred to regulating the environment by means of Pigovian taxes. This regulatory method is popular among economists, but it is unpopular in practice. In general, environmental exchanges and certificates, which are entitlements to pollute (USA), or technical standards (Germany), are preferred to Pigovian taxes. These instruments are similar in many respects. There is, however, a significant difference with regard to the implicit assignment of property rights. Levying Pigovian taxes means giving the citizens implicit ownership of the environment and letting the firms pay the citizens periodically for using the environment via the government budget. Certificates that are rented periodically from the government also have such implications, because they result in a variable flow of payments to the government just like a Pigovian tax. In fact, from an economic

point of view they are no different from Pigovian taxes, and the results derived in the previous section also apply to them.

It is different, however, with permanently valid certificates and environmental standards. Both of these imply that property rights to the environment have been given away by the government and are now held by the firms, either through a formal ownership of the certificates, or through the right to pollute the environment within certain limits. The factor reward or rent resulting from waste emissions accrues to the firm's owners rather than to the general public which receives the tax revenue in the case of Pigovian taxation, as was assumed with (5.3).

This cannot influence environmental policy if international capital movements are exclusively financial, as was assumed in the second section, because the environmental rent will then flow to domestic residents alone. However, when direct investment and cross-border ownership of equity is allowed, things are different, because foreigners are implicit co-owners of the domestic environment and may receive a considerable part of the implicit factor income from waste emissions,  $f_s S$ . An environmental policy operated in the national interest will not take a possible flow of environmental rents to foreigners into account in its calculations and thus will generally result in distorted regulation decisions. This effect was briefly discussed by Sinn (1994, p. 104 n.) in an environmental context and by Huizinga and Nielsen (1997) in the general context of rent taxation, though without an allusion to environmental problems.

In a paper that has received much attention, Oates and Schwab (1988) attempted to prove that systems competition between states that set environmental standards is efficient. In their model, the national government chooses policy measures that are optimal from an overall perspective. Although the authors allow for international direct investment, they abstract implicitly from the possibility of international rent dissipation by making an apparently innocent assumption in the model. They assume that the right to pollute is given to the firms in strict proportion to their use of labour. This assumption makes the employees implicitly the owners of the environment and ensures that the total rent from the free use of the environment goes into their pockets. Since in the Oates and Schwab model it is, moreover, only the employees who direct the regulation policy, and since the model abstracts from the border-crossing spillover effects of pollution, it is hardly surprising that the authors find that systems competition would not lead to an inefficient use of the environment.

In the following an attempt will be made to bring out the particular problems of the certificates, using less arbitrary assumptions. The model will abstract from the technological spillover effects examined above in order to focus on the role of the ownership structure. As before, the government's aim is to maximize the sum of all incomes going to domestic residents, but not all income earned at home will accrue to the domestic residents. Instead, the share  $\alpha$ ,  $0 \leq \alpha < 1$  of the environmental return – that is, the profit and implicit factor reward which results from using the environment – flows to foreign countries in addition to the usual interest payments to the physical capital invested. Let  $r$  be the world rate of return on debt and equity which the single country takes as given.

The analysis starts with the regulation of the environment through the use of permanent certificates, which are needed by the firms if they want to emit waste products and which can be traded among them. The model allows for two consecutive environmental policy decisions in continuous time, a previous one and a current one, and the analysis focuses primarily on the latter. Think of a major reform programme to be passed by parliament which will hold for many years to come. It is assumed that a fixed number of certificates is already in circulation at the time the reform is made, and that these allow an annual flow of environmental waste equal to  $Q$ . The government carries out its environmental policy by selling additional certificates  $S - Q$ , which generate an implicit annual rental income of  $p$  per unit of waste. One certificate allows for one unit of waste per period of time. The rental rate  $p$  is similar to the Pigovian tax analysed above. In particular, the market for certificates among the firms will evaluate the certificates at the marginal product of pollution rights, as in (5.2),

$$p = f_s(K, L, S),$$

where  $S$  is the sum of old and new certificates. With a given rate of return to capital,  $r$ , the stock price of the certificates among private firms will be  $p/r$ . This is also the price at which the government sells the new certificates,  $S - Q$ . If it invests the sales revenue in the international capital market, it will permanently receive the flow equivalent of this revenue,  $r \cdot (p/r)(S - Q) = p \cdot (S - Q)$ , which obviously is equal to the implicit rental income which the new certificates generate for their new owners. The owners of the existing certificates of quantity  $Q$  earn the same rental rate as the government, regardless of what they

once paid for the certificates. If the government considers a marginal change in the number of new certificates, this will change the rental rate and the stock price of the existing certificates,  $p/r$ , implying marginal windfall gains or losses and corresponding changes in the rental income earned by the existing owners. As the owners include foreigners, the government may not appropriately take account of all private benefits and costs resulting from its policy choice and may therefore make distorted decisions.

To analyse the issue formally, the above model, which is based on a linearly homogeneous production function with labour, capital and waste emissions as factors of production, is used again. Nothing changes in equations (5.1) to (5.6) except that the expression for the flow of government transfers financed with the revenue from renting the right to pollute,  $pS$ , is replaced with  $p(S - Q)$ ,

$$T = p(S - Q), \quad (5.14)$$

and the rental income from owning the existing certificates,  $(1 - \alpha)Q \cdot p$ , which accrues to the domestic residents, is added in equation (5.4). Thus, national income can be expressed as the sum of wage income, rental income from owning the existing certificates, transfers received from the government, and the income from capital invested at home and abroad,

$$Y \equiv wL + (1 - \alpha)Qp + T + r\bar{K}. \quad (5.15)$$

The past wealth effects resulting from selling certificates to foreigners are sunk and can be assumed to be captured by the size of the private agents' fixed wealth  $\bar{K}$ .<sup>4</sup> Inserting (5.14) into (5.15) yields the equation

$$Y = wL + r\bar{K} + p(S - \alpha Q), \quad (5.16)$$

<sup>4</sup> It may be easiest to understand the equation (5.15) if it is supposed first that the previous certificates were given away for free. If they were not given away for free, the government collected revenue which it transferred to private agents. Compared to the case of free issues, these agents acquired wealth by receiving the transfers and they lost wealth to the extent that they bought the certificates. In a closed economy the wealth effects cancelled; in an open economy their net effect was positive for domestic residents, because foreigners contributed to government revenue. In any event, the net wealth effect can be assumed to be captured by  $\bar{K}$ .

which shows that national income is the sum of wages, capital income earned at home and abroad as well as the rental income from owning and using the old and new certificates,  $S$ , except for the old certificates owned by foreigners,  $\alpha Q$ .

Applying (5.6) and (5.2), (5.16) can be transformed to

$$Y = f(L, S, K) + r(\bar{K} - K) - f_s(L, S, K)\alpha Q \quad (5.17)$$

which is the sum of the domestic product,  $f$ , and the capital income earned abroad,  $r(\bar{K} - K)$ , as in (5.7), minus the rental income accruing to foreigners,  $f_s \cdot \alpha Q$ . From the point of view of the voters, the optimal environmental policy is given, analogously to (5.8), by the solution of the maximization task

$$\begin{aligned} \max_S U(Y, S^*) \\ \text{s.t. (5.2), (5.5) and (5.17)} \end{aligned}$$

which gives the marginal condition

$$p = f_s = \frac{dY}{dS^*} \Big|_U + \frac{df_s}{dS} \Big|_{f_K=r} \alpha Q \quad (5.18)$$

instead of (5.9). The condition says that the government chooses the number of certificates such that the marginal product of waste emissions, and hence the rental rate for certificates, equals the marginal social damage plus the marginal change in the rental income accruing to foreigners, i.e. the marginal policy externality imposed on people who do not belong to the electorate and whose preferences are therefore neglected. Note that the latter derivative does not simply refer to the second derivative of  $f$  with regard to  $S$  but also captures the impact of an endogenous reaction of capital that satisfies the condition that the marginal product is kept equal to the market rate of interest, as required by (5.2).

Because the production function is linearly homogeneous and  $L$  is a constant, the degree of homogeneity is less than one with respect to only two of the three factors,  $S$  and  $K$ . Thus the factor demand curve for  $S$  is downward sloping when the employment of capital is adjusted optimally,

$$\frac{df_s}{dS} \Big|_{f_K=r} < 0,$$

as was assumed in figure 5.1. This implies that the policy externality is negative and that (5.18) indicates excessive pollution, if compared to the social optimum as defined in (5.13):

$$p = f_s < \left. \frac{dY}{dS^*} \right|_U \quad \text{for } \alpha Q > 0.$$

**Proposition 5.4:** *When the environment is regulated by means of permanently valid certificates and when some of the certificates have found their way into the pockets of foreign owners, a government that maximizes national welfare will, in a second stage, implement too lax an environmental policy even though the waste emissions do not spread across the country's borders.*

Once again we find a reason for ecological dumping, and once again the result can be traced to a negative policy externality of such a policy. This time, however, the externality does not result from a technological spillover effect but from a rent dissipation effect affecting foreign direct investors who came before the environmental policy was chosen. If the government pursues a lax policy, the rental rate of the pollution certificates,  $p$ , falls and with it the firms' return,  $pQ$ , from using the existing certificates. One part of the reduction in the environmental return on existing certificates falls on the domestic residents and thus enters into the decision of the national government. Another part, however, falls on the foreigners and this is the negative policy externality. Since this externality does not enter into the government's calculations, the decision will be distorted in favour of too lax an environmental policy.

If the technological spillover effects analysed in the previous section are added to the rent dissipation effect, the two effects will reinforce one another. The national government then has a dual incentive to neglect the environment as neither the environmental damage abroad nor the damage to foreign owned certificates caused by the depreciation of the property rights enters into its planning.

The suspicion may arise that the depreciation of property rights is an artefact stemming from the neglect of the prior decision of foreign investors to buy the certificates. Would it not be possible that the vigilance of the international investors prevents this depreciation? Would there not be a disciplinary effect which will put the national environ-

mental policy on the right track? These questions can be answered in the negative. It is true that the foreign investors may have rational expectations of what will happen and foresee the effects of the environmental policy on the value of the certificates. If the existing certificates,  $Q$ , were acquired in the expectation that the environmental policy would be lax and the rental rate for certificates low, the stock price of the certificates would be correspondingly low, and the optimizing country would be unable to exploit the investors.

This, however, has no implications for the policy externalities that are modelled here, because they refer to marginal variations in the number of certificates sold, whatever the expected policy was. Even if the original purchasers of certificates correctly foresaw the number of certificates the government sells today and the rental rate  $p$  that this implies, it will still be true that a marginal variation around this number generates marginal windfall gains or losses which partly fall on foreigners and are therefore not fully incorporated in the government's decision problem. To be more specific: with rational expectations about the lax policy which the government chooses, it does not pay for the government to deviate ex post by deciding on a tighter policy because this will create windfall gains for people who do not belong to the electorate. There is a serious time consistency problem which cannot be overcome.

The only way to avoid the time consistency problem would be to make binding contracts between the initial purchasers of certificates and the national government, where the government commits itself to a particular environmental policy, or to paying compensation for wealth losses caused by its actions. However, this way has to be ruled out as impractical and unrealistic. It is not legally possible for a government to bind the environmental policy of its successors in such a way, and it is unimaginable for it to promise to make compensation payments for changes in market prices caused by the political decisions of its successors, because such changes can hardly ever be defined in a way which is sufficiently straightforward for legal procedures.

## ENVIRONMENTAL STANDARDS

In the previous section it was assumed that the firms already have a certain stock of pollution certificates and that the environmental policy is operated by selling or repurchasing marginal amounts of these

certificates. In principle, the section was still dealing with regulating the environment by means of prices.

In contrast, pure quantity standards, such as those used in Germany, are devoid of any pricing elements. To model their effects, it is sufficient to put  $Q = S$  in equations (5.14)–(5.17), because marginal and infra-marginal waste emissions no longer need to be distinguished. Instead of (5.17), national income is given by

$$Y = f(L, S, K) + r(\bar{K} - K) - f_s(L, S, K)\alpha S, \quad (5.19)$$

which is the sum of the domestic product and the capital income earned abroad minus the foreigners' share of the total return from waste emissions. Even though foreigners did not formally acquire certificates, they may have bought company shares, and via the ownership of these company shares they receive a fraction,  $\alpha$ , of the total implicit rental income that results from exploiting the right to pollute. The rental income now shows up as pure rent which flows to shareholders as the residual claimants of the production process. Note that in comparison to (5.17), the given historical quantity  $Q$  has been replaced with the actual emission volume  $S$ . This means that a rent dissipation to foreigners will not only result from a price effect, but also from a countervailing quantity effect.

The maximization problem of the government now is

$$\begin{aligned} &\max_S U(Y, S^*) \\ &\text{s.t. (5.2), (5.5) and (5.19),} \end{aligned}$$

and the first-order condition for a maximum is

$$p = f_s = \frac{dY}{dS^*} \Big|_U + \alpha \left( f_s + \frac{df_s}{dS} \Big|_{f_K=r} \cdot S \right). \quad (5.20)$$

Unlike the previous cases,  $p$  now is only an implicit or shadow rental rate which does not have an analogue in an observable market price. A comparison with (5.9) shows once again that the marginal product of waste emissions may differ from the marginal damage to the households, because there is a policy externality on foreigners ( $\alpha > 0$ ). Note, however, that there is the additional term  $\alpha \cdot f_s$ . As before, the second term in the brackets captures the decline in the implicit rental rate

resulting from a laxer policy, given the emission quantity. However, the first term in the brackets,  $f_s$ , measures the marginal return from an increase in waste emissions, given the implicit rental rate. When new certificates are sold, foreigners do not participate in the marginal return, but when the emission rights are granted for free to firms that have foreign shareholders, they do. Both terms taken together are the marginal revenue to the polluters from an increase in waste emissions, and it is unclear whether this marginal revenue is positive or negative.

If the marginal revenue is positive, the marginal return from waste emissions,  $f_s$ , is higher than the marginal damage,  $dY/dS^*|_U$ , and this indicates that too little waste emission is permitted. A marginal increase in emissions increases the overall return from using the environment, and this effect partly dissipates to foreigners. There is a positive policy externality which the national government does not take into account and which results in an excessively restrictive emissions policy.

It cannot conclusively be said whether the marginal revenue will be positive or negative because knowledge about the form of the production function, which, next to capital and labour, includes the environment as a factor, is lacking. If the factor demand curve has an elasticity of more than one in absolute terms, the relationship between the environmental rent and the amount of pollution is positive and this means that the marginal revenue is positive. If, however, the elasticity is less than one, the marginal revenue is negative and there is an incentive to choose too lax an environmental standard.<sup>5</sup>

**Proposition 5.5:** *If the environmental policy involves setting technical standards and if some of the equity of firms entitled to pollute the environment is owned by foreigners, while the emission*

<sup>5</sup> Bovenberg and van der Ploeg (1996) show, for the case of a linear homogeneous 'nested' production function of the type  $f[Q(K, S), L]$ , that the demand elasticity is equal to

$$\left[ \sigma_{QL} \frac{\alpha_S}{\alpha_L} + \sigma_{KS} \alpha_K \right] \frac{1}{\alpha_K + \alpha_S}$$

where  $\sigma_{QL}$  is the elasticity of substitution between  $L$  and the linearly homogeneous sub-function  $Q(K, L)$ ,  $\sigma_{KS}$  is the elasticity of substitution between  $K$  and  $L$ , and  $\alpha_S$ ,  $\alpha_L$  and  $\alpha_K$  are the partial production elasticities or factor income shares of  $S$ ,  $L$  and  $K$ . I would like to thank Ronnie Schöb for this reference.

*of environmental waste does not spread across the country's borders, the direction in which the policy deviates from the international Pareto optimum is not clear. It is too lax when the elasticity of the demand for the environmental factor is less than one in absolute terms; it is too tight when this elasticity is more than one in absolute terms; and it is just right when the elasticity is equal to one.*

Unfortunately there is no empirical information available that would permit a reliable estimate of the size of the elasticity to be made. However, it should be considered once again that the differential quotient  $df_s/dS$  in equation (5.20) does not only measure a partial change in the marginal product of waste emissions with given quantities of capital and labour but also covers the endogenous change in the amount of capital used which results from the profit maximizing reaction of the firms. This in itself speaks in favour of a highly elastic demand curve for the environmental factor. Looked at in this way, the case of an excessively tight environmental standard seems more plausible – a result which contrasts sharply with the two reasons for environmental dumping that were analysed above and could be the economic reason behind business leaders' accusations that excessively green environmental policies are chosen.

### THE ENVIRONMENTAL POLICY EXTERNALITIES: A SUGGESTED INTERPRETATION

If there are no international policy externalities, there is no reason for doubting the fundamental efficiency of systems competition. This conclusion also holds for the environmental problem. Countries that are linked by trade in goods and capital and that regulate their local environmental pollution by means of Pigovian taxes have no incentive to engage in ecological dumping or to carry out excessively green policies.

Problems arise, however, when the environmental damage is not just local, or when regulation is carried out by means of environment certificates or standards and the returns from waste emissions accrue partly to foreigners. Physical spillovers and rent dissipation across a country's borders imply policy externalities that distort the national policy decisions.

The policy externalities are a reflection of the private decision externalities which led to market failure and legitimated government intervention in the first place. The reason for the failure of the private competition shows up again as the reason for the failure of systems competition, which is what the Selection Principle suggests.

If waste emissions spread not only beyond a firm's but also beyond a country's borders, systems competition does not work well because the single country does not have a sufficient incentive to take account of the environmental damage it causes. It alone carries the full cost of protection measures, in the form of a loss of production, but only gets part of the benefit. The policy decision is distorted in the direction of too lax environmental constraints, and the fear of ecological dumping is justified.

Things are somewhat more complicated with the international rent dissipation effect because this externality has no direct analogue on the micro level. Nevertheless, this effect also results from the public-goods nature of the environment, which excludes a self-regulation by competitive market forces and calls for a government action.

If the government allows for a marginal increase in waste emissions, it incurs a quantity effect and a price effect on the implicit or explicit factor reward for tolerating more pollution. The price effect can be explicit as in the cases of Pigovian taxes and certificates or implicit as in the case of environmental standards. The quantity effect results from the increase in a firm's output because of a marginal increase in waste emissions. It benefits those who receive the marginal environmental factor reward. The price effect results from the accompanying decline in the marginal product of waste emissions whose counterpart is an increase in the wage rate. The price effect represents a redistribution between the factors of production due to the changed relative scarcity brought about by a change in allowed waste emissions. Taken by itself, the price effect makes workers richer, and it makes the recipients of the infra-marginal factor reward from using the environment poorer. Depending on the extent to which foreigners participate in the price and quantity effects on the return from using the environment, the government's decision may be distorted in one or the other direction.

In the case where the government chooses a Pigovian tax to regulate the environment, both the quantity effect and the price effect of a laxer policy affect nationals only. Domestic workers benefit from the wage increase, and domestic residents, who are the residual claimants of a government budget surplus, suffer from the decline in the Pigovian

tax revenue from infra-marginal units of waste emissions. Moreover, the same domestic residents gain from the extra Pigovian tax revenue resulting from the quantity effect. There is no cross-border policy externality and hence no policy distortion.

The same result holds if certificates with a short-term validity are issued which cannot be traded as stocks but are periodically rented to the polluting firms. Such certificates are indistinguishable from Pigovian taxes.

Things are different with permanently valid certificates that are sequentially sold. Again, the quantity effect does not affect foreigners, because the revenue from selling the certificates, and hence the marginal factor return from allowing more waste emissions, flows to domestic residents. However, the price effect does affect foreigners. The resulting wage increase benefits domestic workers and hurts existing domestic and foreign owners of certificates by depreciating the value of their certificates. The larger the share of certificates held by foreigners, the less will the national government care about the depreciation of existing certificates and the more certificates it will sell. Ecological dumping results. Anticipation of the policy decision by foreigners is no remedy. It avoids any expropriation *ex post*, but does not reduce the incentive to choose too lax an environmental policy. Given that no credible commitment strategy is available, the distortion in the cost-benefit calculation of the national government resulting from marginal gains or losses incurred on foreigners is independent of the degree of policy anticipation since the historic purchasing price of the certificates is 'sunk' and cannot be changed *ex post*.

Finally, in the case of setting environmental standards without charging for waste emissions, foreigners fully participate in the positive quantity effect and the negative price effect on the return from using the environment, while workers benefit from the wage increase. If, as seems plausible, the total environmental return increases when the environmental standard is relaxed, there is a positive net externality on foreigners which induces the national government to choose overly tight emission standards.

Over time, the international rent dissipation effect will become increasingly important, because globalization will cause the ownership structure to become more and more diversified. The electorate, which determines environmental policy, and the property owners affected by this policy drift further and further apart and this means that there is a growing potential for conflict and policy distortions.

## POLICY IMPLICATIONS

International policy coordination is urgently needed in view of the massive size of the policy externalities in the area of the environment. Everything speaks in favour of protecting the environment with Pigovian taxes and, if this is done, the tax rates should be harmonized internationally so as to avoid ecological dumping. A factor which is freely tradeable internationally needs the same price everywhere, and the price should reflect both the marginal product of this factor and the marginal cost of providing it. The environment is no exception to this basic economic wisdom. When it is a question of air and water flowing between countries, uniform tax rates are required. Environmental problems that are local in nature, like noise pollution or the quality of the national drinking water, do not, of course, require policy coordination. National incentives are not distorted here.

Coordination would also be appropriate when the national governments regulate the environment by setting standards. However, as is well known from the literature, standards are very inefficient regulatory instruments because, unlike certificates and Pigovian taxes, they cannot regulate a given environmental quality at minimum cost for the firms if the government does not know the shapes of the firm-specific production functions. In general, the government will be unable to equate the marginal products of waste emissions across the firms, and more output than necessary is sacrificed to bring about a given reduction in aggregate waste emissions. For this reason, it would only be a second-best policy to search for a harmonization of environmental standards internationally. Pigovian taxes are the better alternative.

If the certificate solution is introduced with the aim of controlling the environment, then policy coordination is also required, because the national government would otherwise try to expropriate the foreign owners of firms by dumping certificates. Disciplining of the government by foreign investors and forcing it to choose a time-consistent policy is difficult if not impossible in practice because it requires binding contracts which rule out subsequent changes in the number of outstanding certificates. Here, a possible solution could instead be international agreements on the numbers of certificates issued.

It is useful to take a look at the international tax treatment of direct investment in order to understand the nature of this coordination

problem. A time-consistency problem also shows up with the taxation of direct investment, because a national government cannot credibly assure the foreign investors that their capital income will not be taxed excessively after they have made the investment and can no longer react. The government has a strong incentive to do just this later on. The instrument of a double taxation agreement between the countries affected has been developed to protect foreign capital tied up in the domestic country against excessive taxation and to make direct investment possible. To prevent the erosion of the environmental return by issuing too many environmental certificates, a similar form of international cooperation at the government level would be required in the area of the environment.

At the environmental conference in Kyoto in 1997, the US suggested an international system of tradeable environmental certificates that offers a possible solution to the coordination problem.<sup>6</sup> In this system, every country is allocated a fixed limit of waste emissions and compliance is controlled internationally. It is left to the national government to decide which method it will use to regulate its environment, but it must keep total emissions within the agreed limit. Exceeding the limit is possible if the country sells the appropriate emission rights to other countries. The US suggestion solves the international coordination problem and gets rid of the policy externalities stemming from the physical spillover and the rent dissipation effects that have been discussed in this chapter.

<sup>6</sup> See United Nations (1997).

## 6

### The Competition of Product Standards

#### CASSIS DE DIJON AND DEREGULATION COMPETITION

A new era of European competition began in 1979 when the European Court of Justice handed down its Cassis de Dijon judgement. The import of this ruling is that the origin principle now applies to trade within the EU. A good which meets the legal requirements in one European country can be exported freely and without hindrance to every other country in the EU.

The judgement was occasioned by a French blackcurrant-based liqueur, Cassis de Dijon, which according to German product standards contained too little (!) alcohol and therefore could not be sold in Germany. In freeing the French liqueur from trade restraints, the judges also freed Belgian beer and German spaghetti – imports of the former had been prohibited by Germany and the latter by Italy. Neither German purity regulations nor Italian preferences for hard wheat can now permit national authorities to impose import bans. The origin principle is the court's appropriate response to protectionist trade practices. It has led to an improvement in the division of labour in Europe and gains from trade.

There is, however, a downside to the judgement, which relates once again to the Selection Principle. National product standards do not only protect domestic competitors from competition, they also have a responsibility to protect the consumers from buying lemon goods. If the state intervenes in order to protect consumers from a market

failure in quality competition resulting from asymmetric information, then the origin principle becomes problematic because it exposes justified intervention measures to the forces of systems competition. Systems competition may not work in this case since the market failure which caused the state to act in the first place may very well show up again at the level of the competition between regulatory systems. This chapter will show that deregulation competition may result in a lemons equilibrium.<sup>1</sup>

## THE LEMONS PROBLEM

While consumer protection measures of the state usually were interpreted and questioned as paternalistic interventions of the state violating the principles of methodological individualism, Akerlof's (1970) path-breaking study of the 'market for lemons' clarified that such measures may have an allocative justification. They prevent the falling off of product qualities which are hard for consumers to observe. The basic assumption of Akerlof's model is that consumers and producers have asymmetrical information about the quality of the good traded. Producers know precisely what they produce; after all, they are the product specialists. Consumers, however, find it difficult to determine the quality of many products at the time they buy them.

This is not a problem with products that are purchased frequently, because over the long run people come to know what they are dealing with. Expensive products, too, are usually less affected because getting information about their quality before buying them is effort well spent. With cheap and infrequently purchased products, however, the information asymmetry can be important, because consumers are unable to find out about the product through experience and because it is not worthwhile investing in an information search.

The consumers' information disadvantage is particularly large for problems which will occur only with a small probability but which nevertheless will be very harmful if they occur. It would require a very large number of acts of purchase over a long period before the quality could be assessed on a statistical basis. We need only think of a dangerous ingredient in a shampoo or food which causes cancer in only

one in 10,000 consumers. The probability of cancer is certainly an important quality feature of the product but purchasing experience will not disclose it.

In many cases, a precise description of the ingredients on the product package may help to alleviate the information asymmetry. Mostly, however, this is not a real solution, because a great deal of knowledge is needed to assess these ingredients. The consumer would have to consult a food chemist in order to understand the long list of chemical ingredients that would have to be printed on the package – a costly undertaking with the many hundreds, even thousands, of products that are purchased over a year.

The consumer's lack of information implies that the sellers cannot differentiate their prices in terms of the quality of the product. As a result the sellers have an incentive to offer qualities which are relatively poor and cheap. Sellers who would like to offer good quality products and charge a higher price for them find that there is not enough demand because they cannot make the consumers aware of the product's quality. The sellers who offer poor quality products will also try to persuade their customers that these are of high quality. So the market for good quality products will disappear, although informed consumers would be willing to pay a high enough price to make the production of high-quality products worthwhile for the producers.

The example of the European BSE scandal speaks volumes in this context. For many years it was known that BSE was probably spread by feeding cows meat and bone meal. However, farmers had little incentive to take the necessary precautionary measures, since this would have meant switching to more expensive vegetarian fodder, and consumers were unable to find out whether the beef they bought came from cautious farmers. Thus an equilibrium emerged where the probability of buying contaminated food was high. The lemons equilibrium did not collapse until government agencies began to examine the slaughtered animals, found more and more cases of BSE, reacted with dramatic policy decisions that ruined many farmers, and imposed bans on bovine cannibalism.

The lemons problem was originally modelled as a problem of adverse selection. Akerlof's main example refers to consumer durables, such as cars, which the owners can either continue to use themselves or sell to someone else. Because the owners know more about their cars than the potential buyers do, only poor cars – that is, the lemons – are offered for sale. The owners keep on driving the good cars

<sup>1</sup> For other problems associated with the competition between standards, see Knieps (1994).

because they cannot get a higher price for them than for the bad ones.<sup>2</sup> The average quality of used cars of a certain age and brand which are bought and sold is below the average quality of the respective cars with the same age and brand which exist in the streets, because used cars bought and sold are a negative selection.

This is not a problem of justice but one of allocative efficiency. The consumers will not be disadvantaged by the lemons effect because they will learn from their own and other people's previous experiences that used cars are poor cars and will therefore not be willing to pay high prices for them. The point is that they will be unable to buy good used cars at higher prices, because the adverse selection prevents a market for this type of car from being set up. There is a welfare loss from the non-existence of a market for good used cars.

The information asymmetry not only brings about adverse selection but will also give rise to a moral hazard problem. When the consumers cannot distinguish between qualities, the producers have an incentive to produce poorer quality goods so they can save costs. For new cars that is probably less of a problem, because a brand name already provides a definite idea about quality. But people do not only buy branded products whose quality they know about. There are information asymmetries even in the market for car parts and, without stabilizing interventions such as the German DIN norms which are controlled by semi-public agencies, these would show up as quality problems. There is also a moral hazard effect with the dangerous ingredients in food and chemical products because reducing them imposes costs. The BSE scandal should again be mentioned here. Or think of preservatives which endanger health but help foods keep longer. These preservatives can be avoided by using refrigeration and expensive delivery methods, but in many cases the cheaper way of using problematic preservatives would certainly be chosen by firms in the absence of government quality regulations and controls.

In all of these cases government intervention in the form of imposing minimum quality constraints is justified from an allocative point of view, and indeed many countries have developed institutions that serve this purpose. The most prominent of these is the US Food and Drug Administration, whose mission includes the protection of public health by monitoring products for continued safety. Founded under the Food and Drug Act of 1906, its regulatory competence has expanded over

<sup>2</sup> See also Allen (1984), Klein and Leffler (1981) or Shapiro (1983).

the years to include not only food, drinks and drugs, but also cosmetics and therapeutic devices. Drugs and medical devices must be proven effective as well as safe before they can be sold. Institutions comparable to the Food and Drug Administration can also be found in many other countries. The Japanese Centre for the Evaluation of Pharmaceuticals and Medical Devices, the German Federal Institute for Drugs and Medical Devices, the French Agency for the Sanitary Safety of Health Products and the UK Medicines Control Agency are important examples.

In the light of the importance of these interventions, the level of governmental hierarchy at which the supervisory institutions should be placed becomes a key question. If systems competition works, nation states or even provinces could define their standards independently, adjusting them iteratively to maintain their competitiveness and gradually approach an efficient equilibrium. If, on the other hand, systems competition does not work, centralized actions on the EU level may have to be considered. Currently, the EU operates in 27 agreed product fields, including agriculture, public health and transport, and it is unclear whether this range of responsibilities should be further extended. The issue has not been resolved yet but will be on the agenda of a new EU summit in 2004 where the allocation of government functions to the different hierarchy levels will be discussed. The following considerations may add to that debate.<sup>3</sup>

### SIMPLE MODEL OF PRIVATE QUALITY COMPETITION

Before the role of systems competition can be examined, the way private quality competition and the state's regulatory task work has to be modelled. Assume that there is a lemon good of quantity  $x$  and a normal good of quantity  $y$  that can be transformed into the lemon good by shifting factors of production between productive activities. The lemon good can be produced in different qualities, where higher qualities involve higher production costs. Let  $c(q)$  be the unit production cost of the lemon good in terms of the normal good where  $q$  is the quality of the lemon good. The function  $c(q)$  is continuous, differentiable, strictly convex ( $c'' > 0$ ), and has a minimum where  $q = q^*$ ,

<sup>3</sup> See Sinn (1997).

$q^* > 0$ . The variables  $x$ ,  $y$  and  $q$  cannot take on negative values. The normal good is the numeraire and  $P$  is the price of the lemon good in units of the normal good. We consider a representative consumer whose quasi-linear utility function is  $U(x) \cdot V(q) + y$ , where both  $U$  and  $V$  are non-negative and strictly concave monotonically increasing functions.<sup>4</sup> Note that the formulation implies that quality and quantity are complements in the sense that the marginal utility of one item increases with the consumption of the other item.

To concentrate on the allocative distortions resulting from asymmetric information it is important to assume that the consumer can observe the average quality of the lemon good sold on the market but not the quality of the single good that he buys. This formal assumption is a simple attempt to capture the idea that the consumer is able to acquire information on the average quality by talking to other people and by recalling his experience from earlier purchases of similar goods, while he cannot check the quality of a particular good *before* he has bought it.

Taking  $q$  as given, the consumer chooses  $x$  and  $y$  such that his utility is maximized,

$$\max_{x, y} U(x) \cdot V(q) + y \quad (6.1)$$

where he, of course, must observe a budget constraint:

$$\bar{y} = y + Px. \quad (6.2)$$

The variable  $\bar{y}$  measures the consumer's income or endowment. He can spend his income on the normal good  $y$  or on the lemon good  $x$ . The condition for an optimum is Gossen's Second Law, that is, the equality of the marginal willingness to pay for, and the price of, the lemon good:

$$U'(x) \cdot V(q) = P. \quad (6.3)$$

The producer wants to maximize his profits by choosing the lemon good's quantity  $x$  and the quality  $q$  which only he can observe:

$$\max_{q, x} [P - c(q)]x. \quad (6.4)$$

<sup>4</sup> Note that this implies that  $U(x)/x$  is a falling function of  $x$ , a property that will be used in the following appendix.

The necessary conditions for the solution of this optimization problem are

$$P = c(q) \quad (6.5)$$

and

$$c'(q) = 0 \quad \text{for } x > 0. \quad (6.6)$$

Condition (6.5) requires the usual equality between price and marginal cost, and condition (6.6) says that the producer chooses the quality  $q^*$  at which the unit cost of production is minimized. Because the price of the lemon good cannot be made dependent on  $q$ , it is not worth while making any effort to improve the quality beyond  $q^*$ .

The market equilibrium is described by condition (6.6) and by the condition

$$U'(x) \cdot V(q) = c(q) \quad (6.7)$$

which follows from equations (6.3) and (6.5) and requires that the consumer's marginal willingness to pay for a unit of the lemon good be equal to the marginal cost of production.

## AN ALLOCATIVE EXPLANATION OF THE STATE REGULATION OF QUALITY

To make a judgement about the competitive equilibrium and the need for state regulation of quality, the welfare optimum must be known. In a welfare optimum the lemon good's quantity  $x$  and its quality  $q$  are set such that the utility of the representative household is maximized given the economy's technological constraints. Since the economy is endowed with factors of production which allow it to produce a maximum of  $\bar{y}$  units of the normal good and since  $c(q)x$  units of this good have to be given up to produce  $x$  units of the lemon good, the amount of the normal good available for consumption is  $\bar{y} - c(q)x$ . Thus the welfare optimum follows from the following optimization problem:<sup>5</sup>

$$\max_{x, q} U(x) \cdot V(q) + \bar{y} - c(q)x.$$

<sup>5</sup> The social maximand can also be seen as being equal to the sum of the consumer rent  $U(x) \cdot V(x) + \bar{y} - Px$  and the producer rent  $P(x) - x \cdot c(q)$ .

The necessary conditions for a welfare optimum include the quantity condition (6.7) already derived for the market equilibrium and a new quality condition

$$U(x) \cdot V'(q) = c'(q)x. \quad (6.8)$$

Equation (6.8) requires equality between the marginal benefit and the marginal cost of an increase in quality  $q$ , given the quantity  $x$ . As  $U \cdot V' > 0$ ,  $c'(q) > 0$  is required, which, because of  $c'(q^*) = 0$  and  $c'' > 0$ , implies that  $q > q^*$  in the social optimum: from a welfare perspective it is optimal to choose a higher quality than the one implied by the market equilibrium condition (6.6). The following proposition is the obvious implication.

**Proposition 6.1:** *Under the assumptions made, the equilibrium product quality will be too low as judged by the citizens' preferences (lemons equilibrium).*

The difference between the private competitive equilibrium and the social norm is illustrated in figure 6.1. The welfare optimum is given by the point of intersection between the curve DD and the curve EE. The curve DD is the locus of points in which equation (6.7) is met; it gives the optimal quantity given the quality. The curve EE is the locus of points in which equation (6.8) is met; it indicates the optimal quality given the quantity. The competitive equilibrium is characterized by the point on the DD curve corresponding to  $q^*$ , which is defined by equation (6.6): i.e. the absence of any efforts to increase quality above its natural level. As was shown, this point is to the left of the intersection of the DD and EE curves.

In principle, it is possible for the state to improve the market equilibrium by defining a minimum standard for the quality,  $\bar{q}$ , at the point of intersection of the DD and EE curves. As quality improvements are expensive for the firms, they will only supply exactly this quality: that is, they will set  $q = \bar{q}$ . Moreover, they will choose the optimal quantity associated with this quality as described by (6.7) and thus pick the corresponding point on the DD curve.

While it is clear from (6.8) and (6.6) that the intersection of the DD and EE curves is to the right of the competitive equilibrium, more information on the nature of the socially optimal quality regulation

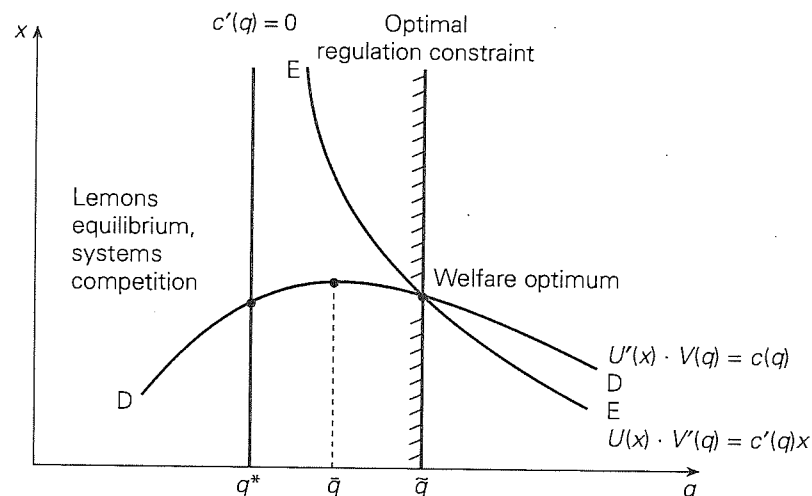


Figure 6.1 The lemons problem and deregulation competition.

can be gained by inspecting the two curves more closely. The properties of the DD curve can be seen by implicitly differentiating (6.7),

$$\left. \frac{dx}{dq} \right|_{DD} = - \frac{A(x, q)}{U''(x) \cdot V(q)},$$

where

$$A(x, q) \equiv U'(x) \cdot V'(q) - c'(q). \quad (6.9)$$

As the term in the denominator is negative, the sign of the slope of the curve DD is equal to the sign of the function  $A(x, q)$ . The assumptions made about the utility and cost functions imply that  $A > 0$  for  $q < q^* + \varepsilon$  where  $\varepsilon$  is a strictly positive constant. The curve DD thus rises to the left of  $q^*$  and in a certain range to the right of  $q^*$ . Assuming that the marginal utilities  $U'$  and  $V'$  decline monotonically towards zero as  $x$  and  $q$  go to infinity while  $c' > 0$ , the curve DD has a maximum to the right of quality  $q^*$ . Let  $\bar{q}$  denote the quality where the DD curve has its maximum.

The curve EE is the locus of those points in which equation (6.8) is satisfied. In the appendix to this chapter it is shown that curve EE is

declining, approaches the vertical at  $q^*$  asymptotically as  $x$  goes to infinity and, assuming the existence of a social optimum, cuts the curve DD to the right of its maximum, i.e. to the right of  $\bar{q}$ . This property is interesting not only because it confirms that in market equilibrium the product quality is too low, but also because it shows that the social optimum lies beyond the range where increasing the quality standard leads to an output increase.

**Proposition 6.2:** *In the case of asymmetric information the state can increase welfare by setting minimum product quality standards beyond the quality chosen by a competitive market. The standard is too low if raising it would induce an increase in the quantity produced. The socially optimal standard lies in a range where a marginal rise in the standard results in a decline of the quantity produced.*

Naturally, setting and controlling of the standard by the state is not a trivial economic exercise. The details of the public decision-making process make it difficult to give concrete policy recommendations for the quality criteria. On the other hand, it is a fact that states have created institutions like engineering control associations, public health offices as well as trade and industry offices whose responsibility is to assess quality properties of goods and to ensure that the minimum standards of product quality are observed. The American public Food and Drug Administration and the German semi-public system of DIN norms are important examples of successful product regulation. However, all countries are not alike in this respect, and in some public quality control operates only poorly. The proposition derived above may help detect the inefficient states by checking how output would react to a raising of the standards. As long as output increases with a rise in standards there is every reason to raise the standards.

## THE COMPETITION OF LAXITY

The analysis now turns to systems competition. Assume that private quality competition takes place within each country according to the rules just described and that each country chooses its optimal system of quality regulation to overcome the deficiencies of this type of competition. What happens when the borders are opened and unrestricted trade based on the origin principle is allowed?

Opening the borders reduces the responsibility of the national regulatory authorities for the domestic population. On the one hand, the authorities are unable to regulate the imports and, on the other hand, the protective effect of the minimum standard also benefits the inhabitants of other countries. In the theoretical case of perfect competition between the regulatory authorities of many small countries which will be analysed here, the consumption possibilities of the domestic population are independent of the behaviour of the national regulatory authority, just as the consumption possibilities of the employees of a firm are independent of the range of products they themselves produce. In the case of perfect competition a regulatory authority can only influence the national welfare through the profits of the domestic producers, not through the utility of consumers.

When analysing the competition between systems one might be inclined to make the optimistic assumption that the responsible consumers in all the countries can know and judge the national standards. In this case, the standard would be a variable in the planning problem of the consumer and a price-quality relationship  $P(\bar{q})$  would emerge in the market. Knowing this relationship, the consumers would choose the quality at which their marginal willingness to pay for an improvement in quality is equal to the expenditure increase the market requires:<sup>6</sup>

$$U(x) \cdot V'(\bar{q}) = P'(\bar{q}) \cdot x. \quad (6.10)$$

The national regulatory authorities would also take as given the price-quality relationship  $P(\bar{q})$  when making their decision. They would try to maximize national welfare via maximizing profit income and thus set the standard  $\bar{q}$  such that the marginal revenue from an improvement in quality is equal to the marginal cost of this improvement:<sup>7</sup>

$$P'(\bar{q}) \cdot x = c'(\bar{q}) \cdot x. \quad (6.11)$$

Taken together, (6.10) and (6.11) result in the efficiency condition (6.9), implying that competition between the national regulatory systems would be efficient.

<sup>6</sup> This marginal condition follows from maximizing (6.1) with respect to  $q$  subject to (6.2),  $P = P(\bar{q})$ , and  $q = \bar{q}$ .

<sup>7</sup> This marginal condition results from maximizing (6.4) with respect to  $q$  subject to  $P = P(\bar{q})$  and  $q = \bar{q}$ .

Unfortunately, however, the optimistic assumption that consumers can judge national standards goes against the Selection Principle. If the nation state regulates only those goods and product qualities that are affected by the lemons problem, then caution is needed, as assessing national standards will confront the consumers with the same problems they face when having to judge the 'standards' of the individual producers within their respective countries. There are 15 countries in the current European Union, and soon there will be 25 countries or more. How can one reasonably assume that, for each lemon good, the consumers will be able to distinguish between 25 national quality standards? The hope that the consumer's confusion in the national context will not carry over to the international choice problem appears to be overly optimistic under realistic conditions. A normal consumer will hardly be able to judge the amount of dioxin contained in shampoos, lysozyme in cheese, sorbic acid in preserves or quillaia extract and polyvinyl-pyrrolidone in drinks. The consumer is already overtaxed by such ingredients in normal competition, and will be just as unable to work his way through the standards of a large number of national regulatory authorities.

The implications of the Selection Principle for the competition between systems are obvious. Since the product price cannot be made dependent on the state's minimum standards because of the confusion of the consumer, a profit maximizing national regulatory authority selects its standard  $\tilde{q}$  such that the production costs of the domestic firms are minimized. That is, it chooses

$$c'(\tilde{q}) = 0,$$

which implies that  $\tilde{q} = q^*$ . The regulatory authority thus decides in the same way as the private firms would, because it is only acting as a subordinate of these firms. Once again an inefficiently low quality level would be realized, as illustrated in figure 6.1.

**Proposition 6.3:** *When the Selection Principle applies, it cannot be assumed that the consumers will be able to distinguish between state-regulated national quality standards. An equilibrium in the competition between regulatory authorities is thus characterized by too lax standards. Systems competition results in a lemons equilibrium.*

## POLICY IMPLICATIONS

The main result of the model presented above is that national consumer protection measures incur a positive international policy externality which distorts the national regulatory decisions. Consumer protection benefits the foreigners because the quality of the goods consumed by foreigners increases without their having to pay more to cover the additional costs. And for the same reason, it harms the domestic firms. Because the utility of the foreign consumers is not considered in the calculations of the national government, there is a policy bias implying overly lax consumer protection.

It is certainly possible to construct a model with foreign owners of domestic firms who are also affected by the consumer protection policy in that they bear part of the resulting cost increase. In such a model there would be a policy externality in the opposite direction which, in itself, would induce too strict a consumer protection policy. However, empirically, there is no question that the internationalization of the goods markets is considerably larger than that of the equity markets. For example, German exports make up 25% of the gross national product, while direct investment by foreigners in Germany is only about 7% of the total volume of investment.<sup>8</sup> Thus, on balance, national consumer protection measures will indeed generate a positive international policy externality and will therefore remain underdeveloped. The concern about the failure of systems competition seems justified even in a more general model than the one considered here.

Attempting to get rid of the policy externality by going back to a destination principle for regulating products would, however, not be advisable because this would encourage the protectionist abuse of this principle which was all too obvious in the Cassis de Dijon example. Supra-national, European solutions may be advisable instead.

It is true, most goods do not need Europe-wide regulation because there is no information asymmetry associated with them. With other goods, it may be sufficient to provide the consumers with information about the properties of the product or create well-defined quality

<sup>8</sup> See Institut der Deutschen Wirtschaft, *Zahlen zur wirtschaftlichen Entwicklung der Bundesrepublik Deutschland 1998*, Cologne, and OECD, *International Direct Investment Yearbook 1998*, p. 145.

categories which the consumers can select from. However, when there are potential health dangers, Europe-wide minimum quality standards which put upper limits on the amounts of the potentially dangerous substances are required. The argument that the poorer countries would perhaps prefer laxer standards than the richer ones is, in principle, defensible, but in practice it is far too weak an argument against such a solution. It should be possible to reach a compromise between rich and poor countries about the number of tolerable human deaths from eating beef that may contain the BSE pathogen.

To implement such a solution Europe needs a supervisory authority like the American Food and Drug Administration which supervises product quality in America with a firm hand. Europe does not have to copy everything from America, but much can be learnt from the American experience with respect to the federal institutions which limit and regulate the systems competition between the individual states.

### Appendix to Chapter 6 The Properties of the EE Curve in Figure 6.1

Assuming the existence of a social optimum, this section studies the properties of the EE curve and shows that this curve cuts the DD curve to the right of the maximum of the DD curve. The EE curve is the locus of those points in the  $x$ - $q$  diagram (see figure 6.1), in which equation (6.8), which defines an optimal product quality for given quantity, is satisfied. It is useful to transform equation (6.8) to

$$\frac{U(x)}{x} = \frac{c'(q)}{V'(q)}.$$

Note that  $U(x)/x$  is a positive and declining function of  $x$ , that  $c'(q) < 0$  for  $q < q^*$ ,  $c'(q) > 0$  for  $q > q^*$  and  $c'(q^*) = 0$  while  $c''(q) > 0$  throughout, and that  $V'(q)$  is strictly positive. Obviously these properties imply that the EE curve lies to the right of  $q^*$  and approaches the vertical above  $q^*$  asymptotically when  $x$  goes to infinity. It is also obvious that  $x$  is a unique function of  $q$ , i.e. that the curve EE cannot bend inwards or be vertical with low values of  $x$ . Thus the curve EE has a negative slope when it cuts the DD curve. This property helps to

locate the point of intersection. An implicit differentiation of (6.8) gives the following expression for the slope of the EE curve:

$$\left. \frac{dx}{dq} \right|_{EE} = [c''(q)x - U(x) \cdot V''(q)]/A,$$

where  $A$  is again the expression defined in (6.9):

$$A(x, q) \equiv U'(x) \cdot V'(q) - c'(q).$$

As the term in squared brackets is positive, the sign of the slope of EE is equal to the sign of  $A$ . It follows that  $A$  is negative where the two curves cut one another. Recall that, as was shown above,  $A$  can only be negative on the DD curve to the right of the maximum of that curve, i.e. in the area where  $q > \bar{q}$ . Thus the point of intersection between the EE and DD curves is to the right of the maximum of the DD curve in a range where a marginal rise in the quality standard lowers the quantity produced.

## Limited Liability, Risk-Taking and the Competition of Bank Regulators

### BANKING RISKS

Banking is not a safe business. Banks can have bad luck when they finance private investment and they can go bankrupt, inflicting a loss on savers who do not get their money back. To keep the risks under control, the banking business is heavily regulated in most countries, but not in all. Where the regulation is lax there tend to be problems. This chapter provides a welfare analysis of banking regulation and studies the competitive forces affecting this type of regulation in systems competition.

The Asian banking crisis demonstrates clearly how important the risks resulting from loose banking regulation can be. The crisis began in Thailand. Foreign bank lenders went on strike when they witnessed that Thai banks were issuing excessively bad loans, and so the Thai baht depreciated strongly. In South Korea, Malaysia, Indonesia, Taiwan, Singapore and the Philippines the situation was no different, and the currencies of these countries soon followed similar paths, leaving a long trail of bankrupt banks behind. The Asian banking crisis propelled the Asian economies into a sharp recession in 1998, which had severe repercussions on economic growth in the rest of the world.

The Asian problems had been preceded by the Savings & Loan (S&L) crisis in the United States and the Mexican crisis in the early 1990s. Both of these crises had a weaker impact on the world economy because they had been mitigated with generous loans by the US government and the IMF. However, they had paved the way for the Asian

disaster by making financial investors aware of the risks they were facing.

While the various banking crises had many facets which cannot be discussed here, there seems to be a common element in that the banks were undercapitalized and had taken excessive risks in the capital market. For instance, in Korea the equity asset ratio fell from 9.5% in 1990 to 6.5% in 1996, the year before the crisis began, and in Mexico the ratio fell from 6.24% in 1990 to 5.5% in 1994, the year of the Mexican crisis.<sup>1</sup> There are illustrative descriptions by Corsetti, Pesenti and Roubini (1998), Dekle and Kletzer (2001), Kane (2000) and Calomiris and Powell (2000), showing that in East Asia as well as Mexico, a substantial part of the problem had indeed been excessive risk-taking and the lack of domestic bank regulation. In Korea, Taiwan, Thailand, Malaysia and Singapore, banking regulation was fragmented between different regulatory agencies, and overall was too lenient or simply ignored in practice. In his Munich Lectures, Dornbusch (1998) argued that it was primarily the preceding liberalization of bank regulation which had made the Asian crisis possible and led the world into a recession.<sup>2</sup>

Undercapitalization not only makes a bank vulnerable in a crisis, it could even trigger off the crisis by inducing excessive risk-taking when the bank enjoys the privilege of limited liability as all corporations do. When the equity base is low, limited liability effectively truncates the probability distributions of income among which a bank can choose and thus creates an artificial type of risk-loving behaviour which was characterized (Sinn 1980, 1982) by the term 'BLOOS rule', after the English proverb 'You can't get blood out of a stone'.<sup>3</sup> As will be clarified in a separate section below, this is basically the same as what was later called a gamble for resurrection or resuscitation.

Because of the Asian banking crisis, the issue of how sound banking behaviour could be assured has regained much attention in the public

<sup>1</sup> OECD (2001).

<sup>2</sup> The macroeconomic implications are not self-evident, though. Blum and Hellwig (1995) argued that banking regulation itself tends to bring about business cycle risks, because the solvency requirements imply particularly harsh credit constraints in a time of recession.

<sup>3</sup> 'Sinn (1980)' refers to the German publication of the author's 1977 dissertation where the phenomenon had been called MAEHKMINN-Regel (Mehr als er hat kann man ihm nicht nehmen). The term BLOOS rule was chosen in the translation published by North Holland in 1983, as cited in the references.

debate, including that between the IMF and the World Bank. Often this debate neglects the implications of the BLOOS rule, but the Basel I Accord of 1988 and the new Basel II Accord, which is currently being negotiated and is scheduled to be implemented in 2005, do reflect the concerns implied in this rule. Both accords define minimum equity requirements of banks, but Basel II allows for a fine tuning in that the banks are obliged to assess the risks of their borrowers and to allocate specific equity amounts to them in order to minimize the bankruptcy risk.

The Basel Accords can be seen as reactions to the failure of international systems competition in the context of banking regulation. If systems competition had functioned well, common minimum equity and risk assessment rules would not have been necessary. Instead, each country could have defined its rules unilaterally, and the international competition of such rules could then have shown which ones perform best. However, the various banking crises have created sufficiently serious doubts concerning the self-regulatory forces of international systems competition to warrant a closer scrutiny of the problem.

This chapter studies the international competition of banking regulation in the context of a simple model of financial intermediation where investment banks collect funds from savers to lend them to risky enterprises. Systems competition has not been discussed in this context, to the best of the author's knowledge.

## LEMON BONDS

A theoretical justification for the mistrust in systems competition can once again be found in the lemons problem discussed in the last chapter, as banks may offer lemon goods, too. The potential lemon good that banks offer to their customers is bonds, the quality of these bonds being defined in terms of the probability at which banks do not go bankrupt and the amount of loan repayment they can ensure even if they do.

The bank's repayment or survival probability depends on the riskiness of the projects chosen, and the loan repayment in the case of bankruptcy depends on the equity the bank owns. The more risk the bank takes and the lower its equity capital, the lower is the quality of the bonds it issues.

If bond purchasers could observe the bank's investment decisions and make a judgement on the appropriateness of its equity base, they would punish any kind of opportunistic bank behaviour by requiring a sufficiently high rate of interest to compensate for the reduced quality of the bonds they buy or by not buying the bonds at all. The bank would therefore not be able to increase its expected profit by deteriorating the bond quality. However, in the presence of asymmetric information (i.e. an imperfect visibility of an individual bank's risk choices) the bank may be able to get away with lowering the quality of the bonds by reducing the expected value of loan repayment without having to offer a higher rate of interest in return.

Such asymmetry in information is indeed realistic because banking is an extremely sophisticated and complicated enterprise, making it hard even for members of a bank supervisory board to keep sight of the risks their bank incurs.<sup>4</sup> The financial instruments that banks use for their business have become so sophisticated and so much business is happening outside the balance sheets that the assumption of well-informed savers would be heroic if not absurd. It is true that savers can observe the equity base of a bank and certain other characteristics, but in order to understand what they mean, they would have to be able to monitor the banks' off-balance sheet business and to become banking specialists. Even the close monitoring of a bank's history does not convey the necessary information because bankruptcy is not only a rare, but also a non-repeating event. The best the bank lenders can achieve is getting some idea of the average frequency of bank failures in general and of the amounts of funds normally repaid in such events.

The knowledge of the general market situation may prevent bank lenders from being systematically expropriated by the banks, because they will require, and be able to receive, a rate of interest sufficiently high to compensate for the possibility of non-performance. However, market knowledge does not provide the lenders with the information necessary to distinguish between good and bad banks and will therefore not be able to exclude opportunistic banking behaviour. Unregulated banks may get stuck in an inefficient equilibrium, where they all choose some degree of overly risky behaviour. A bank which decides to offer a safer product (i.e. a bond with a higher expected repayment value) may not be able to convey this information to its lenders and

<sup>4</sup> The author is a member of the supervisory board of an international banking group.

may therefore not be able to borrow at a lower rate of interest than its competitors can. Offering a safer bond would just increase its expected repayment and lower its expected profit.

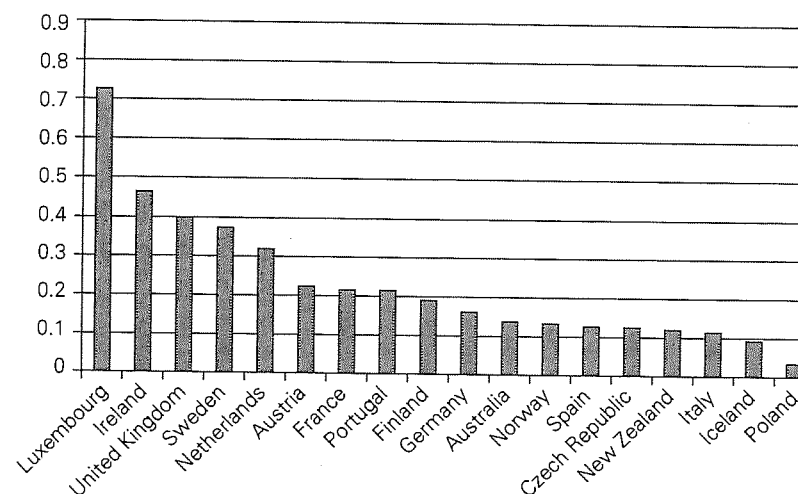
To help the bank lenders make better investment decisions, private rating agencies such as Moody's or Standard & Poor have developed systems that rank banks by the estimated safety of their business. However, as the S&L debacle and the Asian crisis have demonstrated, these agencies are far from perfect and unable to provide the market with timely ranking revisions in response to banks' actions. Only in retrospect did the investors become aware of the true riskiness of their engagements; the rating agencies had not been able to warn them in time. The crises showed that there was still substantial scope for opportunistic banking behaviour behind the public's back.

To protect bank lenders, often ordinary people who entrusted their lifetime savings to the banks, many governments have imposed solvency regulations on banks or insisted on tough self-regulation rules imposed by national banking associations. Some countries, including Switzerland, Germany and, after the Asian crisis, Japan, have imposed very strict regulations, such as minimum legal reserves and extensive creditor rights; others, like France, the United Kingdom or the United States, have placed more confidence in self-regulation.

While the national regulation decisions were normally designed in periods where the banks' lenders were predominantly nationals, globalization has changed the situation substantially. International banking competition has become fierce, possible acquisitions by competitors have become a constant threat to banking managers, and cheap international refinancing has become the cue for banking success in all countries. Banks have internationalized faster than other institutions and firms, and in many countries the share of foreigners among their lenders has increased substantially over recent years. In Germany, for example, this share doubled in the 16 years from 1980 to 1996.<sup>5</sup> Figure 7.1 gives an overview of the situation prevailing among a selection of OECD countries in 1996.

The increasing fraction of foreigners among the banks' lenders may change the national governments' attitudes towards banking regulation

<sup>5</sup> A clear upward trend was observable in 12 of 16 countries for which we had data. In the Scandinavian countries, Spain and Italy the trend was particularly pronounced. However, there were exceptions, like Holland or France, where the share remained constant during the period considered.



**Figure 7.1** Share of liabilities to non-residents in 1996.  
Source: OECD (2001).

since part of the benefits from banking regulation spills over to foreigners while domestic banks may suffer from the constraints imposed upon them. This is the theme of this chapter, and we will see which theoretical basis can be laid.

## A NOTE ON THE LITERATURE ON LIMITED LIABILITY AND RISK-TAKING

Before undertaking the formal analysis, a note on the literature may be appropriate. While there seem to be virtually no studies on the competition of banking regulators, there is a literature showing that limited liability may imply excessive risk-taking. As argued above, limited liability can result in excessive risk-taking if the parties sustaining the potential losses are unable to negotiate for compensation before or while the risk-taking decision is made. In principle, there are at least three reasons why such negotiation may not be possible.

- (1) The party sustaining the losses has a binding contract with the firm, which is sufficiently incomplete to exclude the commitment to a cautious risk strategy. Thus the firm has no incentive to act

cautiously even if the party sustaining the loss perfectly foresaw its actions at the time of signing the contract.

- (2) The party sustaining the loss has no contractual relationship with the firm, and the potential loss is indivisible among a large number of disadvantaged people so that the public goods nature of the problem excludes private side payments along Coasian lines.
- (3) The party sustaining the loss makes a contract with the firm when or before it chooses its risk strategy, but it is unable to monitor the firm's actions.

Jensen and Meckling (1976, pp. 334–7) studied an example with a sequential borrowing and investment decision of a firm which falls under category (1).<sup>6</sup> In Sinn (1980), the artificial incentives for risk-taking for the cases of Bernoullian and  $\mu - \sigma$  preferences are studied using assumptions (2) and (3).<sup>7</sup> With regard to assumption (2) examples like nuclear power plants, chemical plants and automobile liability risks are given and assumption (3) is applied to product liability risks in pharmaceutical products, aircraft, cable cars, and the like. The BLOOS rule which was developed in this context reappeared later under names like 'gamble for resurrection' or 'gamble for resuscitation'. Authors like Minsky (1991), Goodhart (1991, p. 15), Rochet (1992, pp. 1157–9), Dow (1996) and Gollier, Koehl and Rochet (1997) have made useful contributions along these lines.<sup>8</sup>

Jensen and Meckling's assumption (1) has its merits when firms have taken long-term loans and find themselves in an end-game situation. However, the repeated nature of the regular banking business and the fact that most securities issued by banks have a very short maturity reduces the practical relevance for this assumption in the banking context. When a bank's clients can perfectly monitor its actions, as the authors assume in this context, and when there is no clear time structure with regard to the bank's risk choices and the continuous flow of newly issued bank securities, as is the case in reality, there is every reason to assume that the rate of return offered for these securities will fully reflect these choices and that the bank's investment decisions are undistorted. Thus assumption (1) would not be a strong argument

<sup>6</sup> This is similar to Kydland and Prescott's (1977) theory of time consistency.

<sup>7</sup> See also Sinn (1982).

<sup>8</sup> Stiglitz and Weiss (1981) or Bester and Hellwig (1987) referred to related phenomena when they explained why banks can avoid the opportunistic behaviour of their clients by imposing credit constraints.

in favour of banking regulation and is hence not very well suited for a meaningful study of systems competition in this context.

For the reasons explained, this chapter studies the risk-taking of banks under assumption (3), interpreting the lemon bond problem as a problem of product liability risks. The assumption that it is not possible to monitor the relevant actions sufficiently well to punish any kind of opportunistic behaviour by negotiating for better contract terms in exchange does indeed seem realistic in the banking context.

### BANKING WITH UNLIMITED LIABILITY: THE BASIC MODEL

To investigate the information asymmetry between a bank and its lenders formally, a model of a market for bank intermediation is considered. For didactic purposes, the analysis begins with a simplified version of the model without limited liability. The discussion of this feature is delegated to the next section.

There is a capital market with three types of assets:

- (1) Safe assets with a fixed rate of return  $s - 1$  such as government saving bonds.
- (2) Bonds issued by banks which promise, but will not necessarily pay, a rate of return  $r - 1$ .
- (3) Business loans which pay a target rate of return  $q - 1$  if the business is successful, which happens with probability  $p$ ,  $1 > p > 0$ , but pay no return and incur the total loss of capital if the business fails.

In the model,  $s$  is exogenously given, but  $r$  and  $q$  will be explained endogenously.

Private households can directly invest in the first and second types of assets, but can channel their funds into the third type only indirectly, via the intermediation of private banks, because there are prohibitive transactions costs involved by lending directly. The model concentrates on investment banking, abstracting from deposit insurance.<sup>9</sup> There is a

<sup>9</sup> The bonds introduced above can also be interpreted as interest bearing deposits. Note, however, that while deposit insurance is common among OECD countries, none has an insurance for bank bonds and other financial instruments that the banks use to collect their funds. Deposits and deposit insurance are essential ingredients of savings banks, but otherwise they are of limited importance.

fixed number of competitive banks which face an inelastic demand for funds,  $F$ , by private firms. The target rate of return factor  $q$  can be chosen by the bank by controlling the type of business investment it wants to finance. There are options with high levels of  $q$  and low success probabilities  $p$ , and vice versa. In general we assume that the set of efficient return-probability tuples available to the bank can be described by a function  $p(q)$ ,  $p' < 0$ . All agents are risk neutral and banks do not diversify their lending risks, specializing on lending to a selected client or clients whose risks are perfectly correlated. The risks among the clients of different banks are uncorrelated, but each of the identical competitive banks faces the same choice set of attainable probability distributions.

If the risks among the various types of business firms are uncorrelated, the lenders' risk neutrality can be justified with the assumption that they diversify their risks among the various bank bonds, and the banks' risk neutrality (with regard to the legal wealth distributions it faces) can be explained by their owners' perfect diversification among bank shares and other assets. The assumption that banks specialize on just one firm or one class of perfectly correlated risks can, in turn, be justified by prohibitive information costs or the fact that the BLOOS rule is operative and induces a maximum of risk-taking for any given value of expected legal profits.<sup>10</sup>

Consider first the case of unlimited liability where banks will always keep their promises. Here, bank bonds are safe assets and arbitrage in the capital market assures that they generate the same return as government bonds.

$$s = r. \quad (7.1)$$

Consider a representative bank. The expected profit of the bank choosing a project with a target return of size  $q$  is

$$E\pi = [p(q)q - r] \cdot F. \quad (7.2)$$

<sup>10</sup> Strictly speaking this assumption will only be justified within the model set up in the next section where the BLOOS rule is operative. The BLOOS rule implies that the indifference curves in  $\mu - \sigma$  space are downward sloping when the true degree of risk aversion is sufficiently small or the legal probability distributions of wealth extend far enough into the negative range (see Sinn 1980), which may be the case when the bank's investment in risky assets exceeds its equity capital. Downward sloping indifference curves clearly imply that the bank prefers not to diversify its risks.

The optimal risk strategy maximizes the expected return from business lending. It is given by the return-probability tuple at which the marginal expected revenue from business lending is zero:

$$p'(q)q + p(q) = 0. \quad (7.3)$$

## LEMON BANKING AND THE BLOOS RULE

In the model set up thus far, bonds are not lemon goods because unlimited bank liability ensures that the lender gets exactly what the bank promises. However, unlimited liability is far from being realistic, given that no one can lose more than he has. You cannot get blood out of a stone (BLOOS rule). If the bank's equity capital is exhausted, bank lenders will not be able to collect the promised return and they may even lose part of the loan capital they provided.

Let  $C$  be the equity capital the bank owns at the beginning of the period and assume that the bank is required to invest this capital at the safe rate of return  $s - 1$ , using the proceeds from bond issues,  $F$ , for the business investment it finances. If the business project is successful, the bank will be able to service the bonds it issued and its value will be  $sC + (q - r)F$ . If, on the other hand, the business project fails, the value of the bank will be  $sC - rF$  or 0, whichever is higher. This is what the BLOOS rule implies. Multiplying the possible states of bank value with their probabilities and subtracting the end-of-period value of the initial equity capital gives the following expression for the representative bank's expected profit:

$$E\pi = p(q)[sC + (q - r) \cdot F] + [1 - p(q)] \cdot \max(sC - rF, 0) - sC. \quad (7.4)$$

If the bank's equity capital exceeds its repayment obligation,  $sC > rF$ , this expression coincides with (7.2). The limited liability constraint is not binding and the same type of equilibrium emerges as was discussed above. If, on the other hand, the bank's equity is insufficient to satisfy its repayment obligation,  $sC < rF$ , the BLOOS rule becomes operative and creates an artificial risk preference which may change the bank's behaviour. This is the case on which the subsequent analysis will concentrate.

The nature of the artificial risk preference resulting from the BLOOS rule can be illustrated by means of the kinked utility curve as introduced

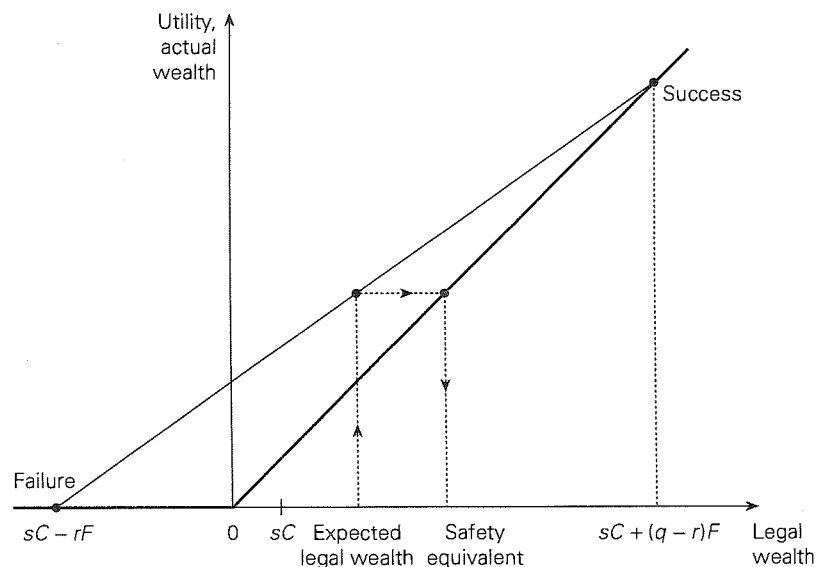


Figure 7.2 Kinked utility and the BLOOS rule.

in Sinn (1980, p. 165; 1982) and represented in figure 7.2. The diagram refers to the alternative states of nature as 'success' and 'failure'. The abscissa shows the bank's 'legal' end-of-period wealth if liability were unlimited, and the ordinate shows the actual end-of-period wealth given that it is, in fact, limited. Because of risk neutrality, actual wealth can be taken to be the bank's (or the bank owners') utility. Without business lending, legal and actual wealth would be  $sC$ . With business lending, legal wealth obtains two possible states:  $sC + (q - r)F$  in the case of success and  $sC - rF$  in the case of failure. Because of the BLOOS rule the utility curve is effectively horizontal for negative legal wealth levels. No matter how strongly negative legal wealth becomes, utility and actual wealth cannot fall short of the level which is obtained in the case of zero legal wealth. Thus, even though  $sC - rF$  is negative, actual wealth is zero in the case of failure.

Consider now the bank's expected utility and the safety equivalent of the legal wealth distribution. Expected utility is a linear combination of the utility levels obtained in the two states of nature,  $sC + (q - r)F$  and zero, with the weights  $p$  and  $1 - p$ . As expected legal wealth is also a linear combination of  $sC + (q - r)F$  and  $sC - rF$  with the same weights  $p$  and  $1 - p$ , expected utility can be constructed graphically by

moving from expected legal wealth on the abscissa upwards to the chord between the two possible points on the utility curve. The safety equivalent is defined as that safe level of wealth which generates the same utility as the probability distribution under consideration. The safety equivalent can therefore be constructed by continuing the move from the chord horizontally to the utility curve and from there back to the abscissa, as is illustrated with the arrows. It is obvious from the diagram that the effective convexity of the utility curve following from the BLOOS rule implies risk-loving behaviour in the sense that the safety equivalent of the bank's legal wealth distribution is above the bank's expected level of legal wealth, and the risk premium is negative. In its choice between safe and risky strategies, the bank is willing to sacrifice expected legal wealth in exchange for the possibility of taking more risks, because, given the rate of return promised to lenders, more risks will generate more expected actual wealth and hence more expected utility.

Of course, however, the rate of return promised to lenders may not be given but depend on the actions of the bank. Lenders will know from their general market observation that the repayment promise of banks cannot be taken for granted. Thus the promised rate of return on bank bonds will have to be sufficiently high to compensate for the reduced payment in the case of bankruptcy. Risk neutrality implies that a capital market equilibrium is characterized by the equality between the expected repayment of a bank bond and the repayment of a safe asset. As the repayment of a bank bond is equal to the bank's promise in the case of success and equal to its equity capital in the case of failure, the equilibrium condition can be taken to be

$$p(q) \cdot rF + (1 - p(q)) \cdot sC = sF \quad \text{for } rF \geq sC. \quad (7.5)$$

The important question is whether and to what extent the constraint imposed by equation (7.5) will affect the behaviour of banks. The answer depends on which of two possible interpretations of this equation, a narrow one or a wide one, is correct. The narrow one is that equation (7.5) applies to an individual bank's actions and shows how the lender's required rate of interest reacts to the bank's policy choices. The wide interpretation is that equation (7.5) is only an equilibrium condition, determining the market rate of interest paid by banks without implying that the single bank can affect this rate through its own policy decisions.

If the narrow interpretation is true, the BLOOS rule will have no behavioural implications relative to the model set up in the previous

section. Inserting equation (7.5) into (7.4) gives again equation (7.2) when account is taken of (7.1), and this is true even if the BLOOS rule is operative. As the bank is unable to manipulate the expected rate of interest paid to its lenders, this rate being equal to the one on safe assets,  $s = 1$ , it will still aim at maximizing the expected return from business lending as is ensured by marginal condition (7.3).

However, for the reasons explained above, the extent of household information of the bank's actions may not go far enough to justify the narrow interpretation. If bank lenders are unable to monitor the individual bank's actions *ex ante* and are therefore unable to anticipate these actions with an appropriate interest demand, the bank's decision problem is no longer compatible with a maximization of equation (7.2), because the bank does not have to alter the promised rate of return,  $r = 1$ , when it changes its risk policy, given that the other banks stick to whatever policies they choose. To understand the bank's incentives in the case of constant  $r$  and the BLOOS rule being operative, rewrite equation (7.4) in the form

$$E\pi = [p(q) \cdot q - r]F + (rF - sC)[1 - p(q)] \quad \text{for } rF \geq sC \quad (7.6)$$

and compare with equation (7.2). The first item on the right-hand side is the expected profit provided that the bank services its bonds under all circumstances. However, the second item measures the advantage that the bank does not, in fact, fully service its bonds under all circumstances but only in the case of survival. In the case of bankruptcy the bank can avoid that part of the promised loan repayment which exceeds its equity capital,  $rF - sC$ , and this advantage contributes to the expected profit to the extent of the probability that it happens,  $1 - p(q)$ . There is a negative externality imposed on the bank's lenders which may distort the bank's decisions.

The single bank will try to maximize (7.6) for a given  $r$ , notwithstanding the fact that  $r$  is determined by the equilibrium condition (7.5). The bank's choice variables are the target return in the case of success,  $q$ , including the corresponding success probability,  $p(q)$ , and the amount of equity capital,  $C$ . Assuming that equity capital is exogenously constrained from below at a level  $\varepsilon$ ,  $C \geq \varepsilon \geq 0$ , the Lagrangean of the bank's decision problem can be written as

$$L = [p(q) \cdot q - r]F + (rF - sC)[1 - p(q)] + \lambda(C - \varepsilon) \quad \text{for } rF \geq sC,$$

where  $\lambda$  is the Kuhn-Tucker multiplier. The resulting optimality conditions are

$$p'(q)qF + p(q)F - p'(q)(rF - sC) = 0 \quad \text{for } rF \geq sC, \quad (7.7)$$

$$\lambda = s[1 - p(q)] \quad (7.8)$$

and

$$\lambda \cdot (C - \varepsilon) = 0. \quad (7.9)$$

A comparison between optimality conditions (7.3) and (7.7) reveals that the bank's risk choices are indeed distorted. The first two items in (7.7) give the marginal expected revenue from seeking a higher rate of return. In an optimum with unlimited liability they sum up to zero since the bank goes to the point where the increase in the target rate of return from business lending is outweighed by the corresponding reduction in the probability of success. With limited liability this policy is no longer optimal since increasing the target rate of return in business lending has the additional advantage that the state of nature where the lenders will have to satisfy themselves with the bank's equity capital,  $sC$ , rather than the promised repayment  $rF$ , becomes more probable, the marginal increase in the probability being measured by  $-p'(q)$ .

The bank's optimum now lies beyond the point of maximum expected revenue from business lending because there is a negative marginal externality it can impose on its lenders by reducing the probability of success. Given the expected return from business investment, a high target return which accrues with a low probability is better than a low target return with a high probability, because the expected loan repayment is lower. Thus, choosing a lower survival probability and a higher target return may be better for the bank even if this implies a somewhat lower expected return to business lending.

Figure 7.3 illustrates the distortion in the bank's decision problem. The upper of the two downward sloping curves is the graph of the function  $p(q)$ , i.e. the probability of successful business lending as a function of the target return factor, and the lower one shows the bank's marginal expected revenue from business lending. Formally, the relationship between the two curves is similar to that between a demand curve and a marginal revenue curve but, of course, this is nothing but a formal similarity. The point of maximum expected revenue is where the marginal expected revenue curve cuts the abscissa

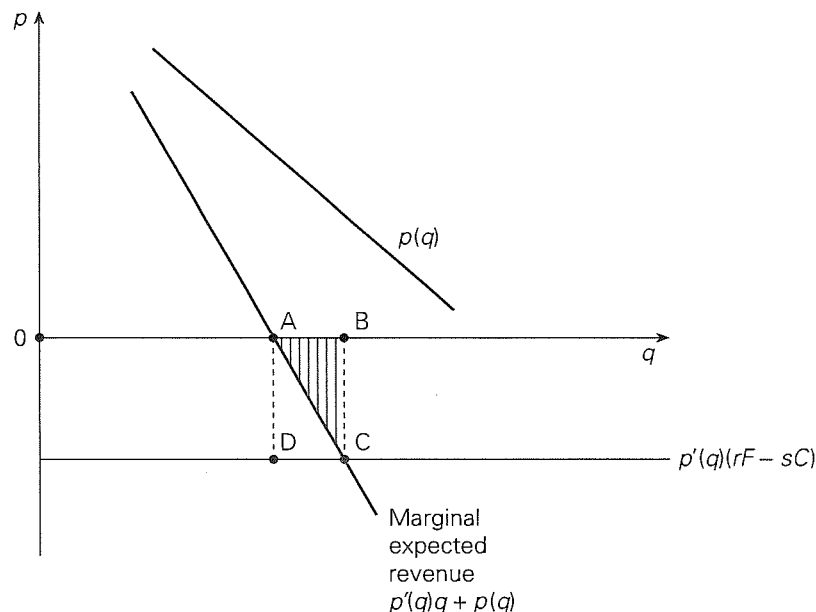


Figure 7.3 The bank's optimal risk choice under the BLOOS rule.

(A), but the bank's optimum is where the expected marginal revenue is sufficiently negative to compensate for the advantage of being able to impose a negative marginal externality on its lenders. In the diagram this marginal externality is measured by the distance between the abscissa and the horizontal line below it. Thus the point of intersection between this line and the marginal expected revenue curve, C, is the firm's optimum in the case where the BLOOS rule is operative.

While there is an interior optimum for the bank's risk choice, there is a corner solution for its equity capital. As equation (7.8) reveals that  $\lambda$  is positive, it follows from (7.9) that

$$C = \varepsilon; \quad (7.10)$$

i.e. the bank will choose as little equity as possible for its operations. This is a straightforward implication of the BLOOS rule. The higher the equity capital, the higher is the payment to lenders in the case of failure, and the higher is the expected refinancing cost. Clearly, therefore, the bank prefers to operate with as little equity as possible and takes only the quantity which it must.

The result contradicts the Modigliani-Miller theorem according to which a firm's debt-equity choice is indeterminate.<sup>11</sup> However, that theorem was derived by abstracting from limited liability and asymmetric information. In the present context, equity capital is more expensive than debt capital for the banking firm since an increase of equity capital increases the payments to lenders in the case of bankruptcy which ignorant lenders will not honour with a lower interest requirement. From a practical perspective, the fact that equity capital is much more expensive than debt capital is obvious for any banking business. Bank managers are eager to spare equity capital whenever they can and to run their banks with as little equity as possible, certainly far less than necessary to be able to cover all the risks they incur.

The result of this section can be summarized as follows.

**Proposition 7.1:** *The combination of limited liability (BLOOS rule) and incomplete information of their lenders induces the banks to minimize their equity volumes and to choose riskier strategies of business lending than in the case of unlimited liability. Banks choose to offer their lenders lemon bonds which will not be serviced with certainty.*

## WELFARE IMPLICATIONS AND OPTIMAL REGULATION

From a social perspective, the bank's risk-taking is excessive. It is true that risk-taking often is productive in the sense that it enables people to make use of the opportunities nature offers them. Risk-consolidating devices such as insurance and stock markets can be seen as augmenting one of the economy's most important factors of production (Sinn 1986) and to have significant growth effects. However, in the present context, risk-taking may be excessive because it is induced by an externality which the bank imposes on its lenders rather than a consolidating activity.

Assume that  $s$  measures the true social opportunity cost of bank lending, that  $q$  and  $0$  denote the true social returns from business lending in the cases of success and failure, and that the probability  $p$  is

<sup>11</sup> Modigliani (1961; 1982) and Miller (1977).

both the subjective and objective probability of success. Then welfare  $W$  is given by the difference between the expected social return of business lending and the alternative return which savers could have earned had they invested their funds in safe assets:

$$W = [p(q)q - s] \cdot F. \quad (7.11)$$

The optimal amount of risk-taking as measured by the target return and the corresponding success probability follow from the first-order condition of a maximum of (7.11),

$$p'(q)q + p(q) = 0. \quad (7.12)$$

Obviously, it coincides with the bank's optimum in the case of unlimited liability, as defined by equation (7.3).

The social optimum is given by point A in figure 7.3. The welfare loss from choosing point C instead of A is given by the shaded area ABC between the marginal expected revenue curve and the abscissa. The area shows by how much the expected revenue from business lending declines due to the bank's attempts to reduce the expected loan repayment to its lenders.

Interestingly enough the banks burn their own fingers with this policy, because it is they alone who bear the welfare loss resulting from their opportunistic behaviour. Because of (7.5), lenders will be able to receive a fair compensation for the bankruptcy risk in a market equilibrium. The welfare loss shows up exclusively in terms of a reduction of bank profits and hence a corresponding decline in the value of banking firms. Households suffer no loss although they buy the lemon bonds.

The irony of the result can be seen most clearly in figure 7.3. Suppose for a moment, all banks choose point A. By moving from A to C, the single bank can increase its profit by an amount given by the area ACD because it reduces its expected loan repayment to its lenders by an amount equal to the area ABCD which is more than the decline in the expected return from business lending, ABC. However, if all banks behave that way, different lending conditions will emerge where the banks' lenders will be able to fully avoid a disadvantage. If all banks operate at point C instead of A, they are unable to reduce the expected loan repayment, and hence their profits fall by the area ABC. This can be summarized as follows.

**Proposition 7.2:** *The risk-taking resulting from the BLOOS rule and asymmetric information is too large from a welfare perspective. The welfare loss will be borne by the banks alone and result in reduced banking profits.*

The remedy to cure the market failure is some sort of collective action which imposes constraints on the single bank's behaviour. This could be an agreement among the banks, or it could be banking laws that exclude misbehaviour. The national solutions differ in this regard. There is a multitude of constraints which the countries impose on their banks, but the imposition of bank solvency rules in the sense of setting minimum equity requirements seems to be common to all major countries.

The model set up above shows that this is indeed a useful approach. Let  $\epsilon$  be the minimum amount of equity capital required by law. From equations (7.7) and (7.10) it follows that it is possible to reduce opportunistic behaviour by increasing this minimum. The higher is  $\epsilon$ , the lower is the marginal externality distorting the bank's behaviour, and the lower is the extent of risk-taking as represented by the size of the target return:

$$\frac{dq}{d\epsilon} = \frac{-p'(q) \cdot s}{d^2 E\pi / dq^2} < 0 \quad \text{for } rF \geq s\epsilon. \quad (7.13)$$

Here

$$\frac{d^2 E\pi}{dq^2} = 2p'(q)F + p''(q)[(q - r)F + s\epsilon] < 0 \quad \text{for } rF \geq s\epsilon$$

is the second-order condition for the bank's optimization problem, which is assumed to be satisfied. It is even possible to induce firms to behave optimally. If  $s\epsilon \geq rF$ , it follows from (7.7) that there is no distortion at all because the equity capital is large enough to prevent the BLOOS rule from becoming operative.<sup>12</sup> This can be summarized as follows.

<sup>12</sup> Under realistic conditions, the bank's probability distribution has a very long but thin lower tail. To ensure that this tail lies completely in the range of positive legal wealth levels, a very large equity stock could be necessary, but such a strict interpretation of the model would make little sense. If only part of the tail of the probability distribution lies in the range of negative legal wealth, the firm's risk preferences may still be fairly normal and may not imply a pathological degree of risk-taking. See Sinn (1980, chapter III, section B1).

**Proposition 7.3:** *With the imposition of minimum equity requirements it is possible to reduce and even avoid the welfare loss from excessive risk-taking which is implied by the BLOOS rule.*

## THE COMPETITION OF BANKING REGULATION

While it is in the national, and even the national banks', interest to impose minimum equity requirements when all competing banks are governed by them, things may be different in an international context. Although the banks themselves have tended to lobby for strict national banking rules, their interest in such rules has been fading away with the rapid globalization of recent years. The argument used by banking representatives is that the unilateral imposition of tough banking rules is unfair since these rules increase the national cost of the banking business and imply a competitive disadvantage relative to the rest of the world.

The argument would make little sense if it could be assumed that international lenders reward tough national banking laws by sufficing themselves with lower rates of interest, knowing that the bonds they buy have a higher quality than those of other countries. But, obviously, the banking representatives do not believe that international lenders behave this way. While it is true that the refinancing rates differ to some degree according to the assessment of the rating agencies, there is the widespread fear that the observable differences by no means reflect the true differences of the risks imposed on lenders. The bank lobbies' pressure on national governments not to impose stricter banking rules than do competing countries is therefore overwhelming, and in fact the pressure goes in the direction of national liberalization. The Asian banking crisis, which in the opinion of many observers could have been prevented with stricter banking laws, may have been the result of a competition of laxity in regulation.

Suppose for a moment that this view is wrong and that bank lenders are able to assess the meaning of national banking laws even though they are unable to monitor a single bank's risk-taking behaviour. In this case, lenders from at home and abroad would be able to infer from the national banking law which target rate of return and which success probability the domestic banks will choose, and they would use equation (7.5) to determine the rate of interest they require from

the banks of a particular country. The national government would then take the behaviour of savers and banks into account when choosing its banking law. As national and international savers would receive an expected rate of return equal to the given world market rate of interest for safe assets,  $s = 1$ , the government's policy choice would be irrelevant for households, but would affect the national banks' profit. National welfare maximization would therefore be identical with the profit maximization of a single bank with well-informed lenders. Integrating (7.5) into (7.6) would result in equation (7.11), and obviously it would be in the national government's interest to induce the domestic banks, by way of setting  $\epsilon$ , to choose a target return which satisfies (7.12) and to maximize the expected return from business lending.

Though logically possible, this scenario is not really convincing since it contradicts the Selection Principle. If the high degree of complication and sophistication of the banking business makes it hard, if not impossible, for savers to assess a bank's true solvency, how can one reasonably assume that savers who dare to lend to foreign banks will understand and correctly assess the implications of national banking laws? There are currently 206 countries in the world, and there are nearly as many banking laws. To assume that savers know what they get if they entrust their money to a bank in Fiji Islands, Madagascar or Turkmenistan would be courageous to say the least.

Thus, the situation of a national government may be similar to that of a single bank that faces ignorant lenders. If the government imposes a tough banking law which prevents or reduces opportunistic banking behaviour, it will not be able to convince lenders of the better quality of national bank bonds and will therefore not be able to reduce the rate of interest which the lenders request. The government will therefore have to take into account that the imposition of a minimum equity requirement makes domestic banks worse off and their lenders better off. If it were equally interested in both bank profits and the well-being of lenders, it would impose an equity requirement sufficient to satisfy the closed economy welfare maximum as defined by (7.12). However, given that many lenders come from abroad, it certainly is not that impartial.

Being elected by domestic residents, the domestic government will only take their situation into account and neglect foreigners, thus imposing a policy externality on other countries. In principle, there can be foreign bank owners and foreign lenders. Thus there may be

two types of policy externality. The first one results from asymmetric information and is inflicted on foreign bond holders; it is basically the lemons externality analysed in the context of the introductory banking model. The other one results from a sequencing or time inconsistency effect, similar to the one analysed by Jensen and Meckling (1976, see literature section, case (1)). It is inflicted on the bank's foreign shareholders who bought the shares knowing that they would have to bear the consequences of subsequent policy changes without being able to require a differential compensation. The asymmetry among these policy externalities reflects the fact that bank securities will be revolved regularly while shares are eternal contracts. Bank bonds are therefore assumed to be bought after, or simultaneously with, the government regulation decision, and shares are assumed to be bought before.

Let  $\alpha$  be the share of domestic residents among the people lending to domestic banks and  $\beta$  the share of the domestic banks owned by domestic residents. Using the expected utility of bank lenders,

$$EU = p(q)rF + [1 - p(q)]s\epsilon - sF \quad \text{for } rF \geq s\epsilon,$$

and, from (7.4), expected profit,

$$E\pi = p(q)(q - r)F - [1 - p(q)]s\epsilon \quad \text{for } rF \geq s\epsilon,$$

national welfare in the open economy can be written as

$$W = \alpha EU + \beta E\pi.$$

The competitive government will try to maximize  $W$  by choosing its policy parameter  $\epsilon$  (the required minimum equity) appropriately. The government knows from the BLOOS rule that a marginal variation of  $\epsilon$  will affect the market outcome when  $s\epsilon \leq rF$  but not when  $s\epsilon > rF$ . Taking account of the national banks' profit maximizing reaction to a change in  $\epsilon$  as given by (7.13), the government calculates the derivative of national welfare with regard to its policy parameter for the case where  $rF \geq s\epsilon$ :

$$\frac{dW}{d\epsilon} = (\alpha - \beta)(1 - p)s + \alpha \frac{dq}{d\epsilon} \Big|_{(7.13)} \left[ p'(q)(rF - s\epsilon) + \frac{\beta}{\alpha} \frac{dE\pi}{dq} \right]$$

which simplifies to

$$\frac{dW}{d\epsilon} = (\alpha - \beta)(1 - p)s + \alpha \frac{dq}{d\epsilon} \Big|_{(7.13)} p'(q)(rF - s\epsilon) \quad \text{for } rF \geq s\epsilon \quad (7.14)$$

since  $dE\pi/dq = 0$  will hold in the bank's optimum as defined by (7.7)–(7.9). Equation (7.14) shows that the sign of the derivative of national welfare with regard to the required minimum equity depends on two items. The first one represents the redistribution from banks to lenders which is brought about by a marginal increase in the equity requirement, given the bankruptcy probability  $1 - p$ . If the share of domestic lenders exceeded the share of domestic bank owners,  $\alpha > \beta$ , this welfare effect would be positive, but it is negative if the share of domestic bank owners is larger, i.e.  $\alpha < \beta$ . The second item reflects the fact that a higher equity requirement induces the banks to take fewer risks, i.e. to reduce the target return  $q$  and the corresponding bankruptcy probability  $1 - p$ . This helps the domestic lenders to the extent that the banks' equity capital falls short of the promised loan repayment,  $s\epsilon < rF$ , and to the extent that there are such lenders as measured by  $\alpha$ . In principle, banks are hurt by a similar effect, but, at the margin, and in the banks' optimum, the disadvantage is exactly outweighed by the increase in the expected return from business lending. So only the effect on lenders has a net impact on welfare.

The overall impact on welfare of an increase of  $\epsilon$  is ambiguous, depending on the factors mentioned. Consider a few special cases for the derivative  $dW/d\epsilon$  which all refer to the case where the BLOOS rule is binding.

- (1) There are no domestic lenders and no foreign bank owners:

$$\alpha = 0, \beta = 1 \Rightarrow \frac{dW}{d\epsilon} = -(1 - p)s < 0 \Rightarrow \epsilon_{\text{opt}} = 0.$$

The competitive government does not impose any equity requirements on banking firms.

- (2) There are only domestic lenders and only foreign bank owners:

$$\begin{aligned} \alpha = 1, \beta = 0 \Rightarrow \frac{dW}{d\epsilon} &= (1 - p)s + \frac{dq}{d\epsilon} \Big|_{(7.13)} p'(q)(rF - s\epsilon) > 0 \\ &\Rightarrow \epsilon_{\text{opt}} \geq \frac{rF}{s}. \end{aligned}$$

As  $dW/d\varepsilon > 0$  in the whole range where the BLOOS rule is binding, the competitive government imposes an equity constraint large enough so that the banks can always keep their repayment promises. In this case only a minimum level  $rF/s$  for  $\varepsilon$  can be derived, the exact value itself being indeterminate. (Note that the formula only applies to the range where the constraint is binding. If it is not binding, it follows from (7.4) that the model set up with equations (7.1)–(7.3) applies such that  $dW/d\varepsilon = 0$  for all  $\varepsilon > rF/s$ .)

(3) Both domestic resident shares are positive, but the share of domestic lenders is at least as high as that of domestic bank owners. In this case, the first item in (7.14) is non-negative and the second is strictly positive as long as  $s\varepsilon < rF$ . It follows that

$$\alpha \geq \beta > 0 \Rightarrow \frac{dW}{d\varepsilon} > 0 \quad \text{for } \varepsilon > \frac{rF}{s} \Rightarrow \varepsilon_{\text{opt}} \geq \frac{rF}{s}.$$

Once again it is optimal for the national government to impose an equity requirement large enough so that the banks will be able to repay their loans even in the case of bankruptcy.

(4) Suppose finally that the share of domestic lenders is positive and smaller than the share of domestic bank owners, i.e. that  $\beta > \alpha > 0$ . Suppose further that the second item in (7.14) outweighs the first one when  $\varepsilon = 0$ , i.e.  $\alpha \frac{dq}{d\varepsilon}|_{(7.13)} p'(q) rF > (\beta - \alpha)(1 - p)s$ . This is the case of an interior solution, because  $dW/d\varepsilon > 0$  when  $\varepsilon = 0$  and  $dW/d\varepsilon < 0$  when  $\varepsilon = rF/s$ . From the first-order condition  $dW/d\varepsilon = 0$  we get, after a few manipulations:

$$0 < \alpha < \beta \Rightarrow \varepsilon_{\text{opt}} = \frac{rF}{s} - \left( \frac{\beta}{\alpha} - 1 \right) \frac{1 - p}{p'(q) \frac{dq}{d\varepsilon}} \Big|_{(7.13)}$$

where  $0 < \varepsilon_{\text{opt}} < rF/s$ .

The national government imposes some regulation on the banks, but the regulation remains nevertheless too lax to completely prevent the BLOOS rule from becoming operative and inducing banks to take more risks than in the cases of informed lenders or unlimited liability.

It is not entirely clear which of these cases prevails most frequently in reality. However, it appears that the cases where banks are predom-

antly owned by nationals and borrow funds world-wide seem to be particularly relevant. While comparative international statistics are not available, the example of Germany confirms this impression. Foreigners possess only little more than 3% of the existing equity capital of German financial institutions,<sup>13</sup> but they hold 17% of the German banks' outstanding bonds and liabilities (see figure 7.1).

When bank bonds are more widely distributed internationally than bank shares, systems competition would be described by case (4) or could even be close to case (1) so that a corner solution with  $\varepsilon = 0$  prevails. Both cases characterize a lax regulatory behaviour of national authorities. In fact, the regulation would be *too* lax, for it is clear that the national regulatory optimum for the closed economy, which results from  $\varepsilon \geq rF/s$  and was characterized with (7.12), is also the optimum for the whole world. A proposition summarizes the results.

**Proposition 7.4:** *International competition among bank regulators will not, in general, be efficient when regulators maximize national welfare, lenders are unable to monitor bank behaviour, and there are foreigners among the lenders and/or bank owners whose preferences are not taken into account by the regulators. If the share of domestic residents among the bank's owners exceeds the share of domestic residents among the bank's lenders, regulation will be too lax in the sense that national authorities do not, or not fully, exclude the opportunistic risk-taking behaviour resulting from the BLOOS rule.*

Again the different roles of lenders and firm owners and the nature of the effects imposed upon them must be emphasized. The effect on foreign lenders results from asymmetric information and the inability of these lenders to recognize variations in the risk of repayment. It is independent of the time period for which the bonds are issued and arises even with short-term securities issued repeatedly by the banks. The effect on the bank's foreign owners instead results from the mere fact that an ownership title is a permanent link to a firm which then inevitably implies that the owners are affected by regulatory changes. It is possible that the profit implications of such changes were anticipated by foreigners before the foreigners acquired shares of a bank.

<sup>13</sup> According to the Bundesbank, foreigners hold €9.237 billion of equity and direct participations. This is 3.2% of the total stock of equity reported by the OECD.

In that case, these implications will have been capitalized in share prices and the foreigners will just earn the normal rate of return on their ownership titles. However, this is irrelevant for the regulator's incentives, as long as he cannot commit to a regulatory policy before the foreigners buy the shares. Whatever was anticipated in the share price, the regulator will know that foreigners are affected by marginal variations in his policy according to the size of the foreign share ownership then prevailing,  $1 - \beta$ , and this will distort his policy choice as modelled above. It would not even matter if foreigners could sell the bank shares after a policy move has been announced because the profit consequences will then certainly be capitalized in share prices and not affect the returns that purchasers can earn.

Things are different when policy makers can commit themselves to a certain regulatory policy before bank shares are bought by foreigners. In that case, all profit implications even of marginal decisions will accrue to domestic residents only, and in the above model it would be necessary to set  $\beta = 1$  to depict this case. This would mean that either case (4) applies with a lower value of  $\epsilon$  or that there is even a corner solution with  $\epsilon = 0$ , similar to case (1). The concern that systems competition will result in an overly lax regulation would be strengthened. In general, what counts is the share of domestic residents among the banks' owners at the time the regulatory decisions are made or firmly announced, and this is how the parameter  $\beta$  should be interpreted.

### THE BASEL COMMITTEE AND EU ON THE RIGHT TRACK

You can't get blood out of a stone. This wisdom explains why decision making under risk is often distorted in the direction of excessive risk-taking when decision makers face possible losses, whose size exceeds their wealth or that part of their wealth which will be made liable for compensation. A bank's loan repayment liability is an example of this. When banks can choose between high target returns in business lending that occur with a low probability and low ones that occur with a high probability they may prefer the high target returns even though a lower expected return results. The reason for this type of risk preference is that higher probability of bankruptcy means a higher probability that ignorant lenders who are unable to monitor

the bank's actions will not be able to collect the promised repayment. Lenders buy lemon goods and banks enjoy lower financing costs.

To avoid a market for lemon bonds national governments usually impose solvency constraints on domestic banks. However, in the process of globalization where an increasing fraction of the banks' lenders come from abroad, the incentive for the national governments to impose tough solvency constraints diminishes, since part of the benefits of such constraints accrue to foreigners while a comparatively large fraction of the resulting increase in banking costs is borne by domestic residents. Thus there is the risk that systems competition will in fact be a competition of laxity where the problem of lemon bonds, which brought in the national governments in the first place, reappears on the international level. Once again, the Selection Principle is operative in systems competition.

In such a situation, an international harmonization of solvency requirements seems appropriate. As mentioned in the introduction, more than a decade ago, the Basel Committee on Banking Supervision (1988) introduced its Capital Accord known as Basel I. Since then, the business of banking, risk management practices, supervisory approaches, and financial markets each have undergone significant transformation, and many of the old provisions have proved to be no longer adequate. Thus, in June 1999, the Basel Committee on Banking Supervision issued a proposal for a new bank capital adequacy framework, Basel II, to replace Basel I. At the time of writing, the consultation process is still under way, and it is expected that the new Accord will be applicable not before the year 2005.<sup>14</sup>

The rationale for the Basel II Accord can be summarized by aiming at more flexibility and more risk sensitivity with regard to individual loans given out to private business. Banks have more choices, but they have to evaluate their borrowers more carefully and to underlay each individual loan with a specific amount of equity, depending on the risk class to which the borrower belongs. There is more emphasis on the combination of effective bank-level management, market discipline and supervision in contrast to the focus on the single risk measure that was used in Basel I. Basel II intends to provide approaches which are both more comprehensive and more sensitive to risks than Basel I,

<sup>14</sup> See Basel Committee on Banking Supervision (2001) for the details of the latest proposal.

while maintaining the overall minimum equity requirement of 8% of equity capital to risk-weighted assets. Unlike before, however, external credit assessments will be used to properly evaluate the true risk of business lending.

Basel II also aims at bolstering market discipline through enhanced disclosure by banks. Effective disclosure is essential to ensure that market participants can better understand banks' risk profiles and the adequacy of their capital positions. It reduces the lemons problem discussed in this chapter by informing lenders about the true risks they incur, thus helping systems competition to function better than it otherwise would do. However, the authors of Basel II certainly do not believe in a liberal approach where disclosure is all that is needed to avoid the asymmetric information among lenders and regulatory authorities which is the cause of the welfare loss resulting from systems competition.

The review of Basel I complements a review already under way of EU legislation on bank capital requirements to shape a new EU capital adequacy framework. The revised EU bank capital legislation is supposed to replace the existing legislation on capital requirements which basically has been in place since 1988.<sup>15</sup> The aim of the revision is to ensure that European banks and investment firms are able to respond quickly to market changes and to guarantee both financial stability and the smooth functioning of the internal market in financial services. The EU proposal also focuses on minimum capital requirements, a supervisory review process, and an emphasis on market discipline.

The Basel Committee on Banking Supervision as well as the European Commission want to create a new global capital framework that guarantees greater stability of the international financial system by better reflecting the changes in financial markets in recent years. By cooperating closely and by coordinating the timing of the review processes, both institutions ensure that the harmonization rules do not contradict but rather complement one another. Basically, the policy response coincides with the recommendations following from the theoretical analysis of this chapter. Rather than relying on unbridled systems competition, collective international action is taken to avoid the welfare losses from lemon banking which otherwise might occur.

<sup>15</sup> See Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions.

It should not be overlooked, though, that both the Basel and the EU approaches suffer from a lack of enforcement possibilities for countries not directly involved. The original Basel agreement was a voluntary commitment by the G-10 countries, and Basel II is a voluntary agreement backed by 13 countries. The EU rules will be binding for all 15 EU countries, which will have to adjust their banking laws accordingly. Other countries, in particular Latin American and Asian countries, cannot be forced to obey the rules if they do not want to. In total only 19 out of 206 countries in the world have committed themselves.<sup>16</sup> How the other countries will react and whether this number is enough to make systems competition workable remains to be seen.

<sup>16</sup> The participating countries are the EU countries, Canada, USA, Japan and Switzerland.

## The Competition of Competition Rules

### A TOTTERING CREED

Europe, indeed the whole world, is now at the start of a new stage of development in which the landscape of its firms is being redrawn. The common European market has been created, and international competition has become far more intense in the process of globalization than anyone could have anticipated. In the years to come the business world will be completely restructured. Economists have been astonished by the increasingly frequent news reports about mega-mergers and 'strategic alliances' which previously would have been quite unthinkable. Former bitter rivals are now amalgamating and creating conglomerates that occupy large shares of markets. European companies, in particular, have been caught up in the wave of mergers. When Switzerland allowed the merger of Schweizerische Bankgesellschaft and Schweizerischer Bankverein under the new name United Bank of Switzerland (UBS) it paved the way for the largest bank of Europe, and when Bavarian Hypo and Bavarian Vereinsbank were allowed to merge, Europe's third biggest bank was formed. Other merger and acquisition cases of major importance were in the US the merger of Mobil Corp. and Exxon Corp. (the world's largest deal in 1998), in the UK of SBC CableComms and TeleWest Communications plc and in Japan of Sanyo and Toshiba (in the field of batteries production). At the same time, privatized state firms are not dismantled as they should be for a truly competitive solution, but are left intact by the national authorities so as to consciously create international players.

Electricité de France, Spanish Telefonica or Deutsche Post are only three examples out of many.

The general attitude among politicians and company boards is that it is time to prepare for globalization and that the risk of coming too late must be avoided. The conglomerate that gets into position first can occupy ground before the others come. It enjoys a first-mover advantage, forcing its followers to content themselves with the share of the market that remains.

In this situation, the national antitrust authorities face considerable pressure to distance themselves from their old, established ideas and to remove the existing obstacles for mergers and strategic alliances. Domestic competition is now taking second place to international competition, and this is forcing the national antitrust authorities to behave like competitors themselves.

It was the credo of *ordo liberalism* that, although an unconstrained competitive market economy would be able to ensure an efficient allocation of resources, this type of economy would be inherently unstable.<sup>1</sup> The competing firms would always have an incentive to merge, because, by doing so, they could reduce supply, increase prices and raise profits. A cartel authority would be necessary to stabilize the competition and it would do so by prohibiting collusion, take-overs and mergers. Competition could only function if it was subject to strict rules enforced by the state. Antitrust laws and federal cartel offices were established as a result of this way of thinking.

The *ordo liberal* recommendations obviously make sense in a closed economy. A government which endeavours to maximize the welfare of its citizens will try to establish effective monopoly controls in order to produce a workable form of competition. The question is, how will this incentive structure change in the era of globalization? How will the forces of systems competition influence the behaviour of the cartel authorities and the decisions of the legislators, if these legislators are concerned with the welfare of their own people? Has an *ordo liberal* economic policy any chance of surviving in systems competition?

Interest in *ordo liberal* policies has already waned as a result of the globalization of the economy. Warnings about domestic mergers are usually pushed aside by arguing that international competition is fierce and that the domestic industries must be armed against this competition. The *ordo liberal* creed is tottering.

<sup>1</sup> See Eucken (1952) as well as Berle and Means (1932).

It is, however, not quite clear whether a retreat from the *ordo liberal* way of thinking is really wise from a national point of view. The defenders of the *ordo liberal* school argue that it would not be in the national interest to loosen the antitrust legislation but to keep the national competitive forces intact, even if other countries allowed their companies to merge and increase their market power. Sticking to a strict competitive policy would serve the national interest more than the creation of national conglomerates, regardless of what the other countries are doing.

If this view is correct and generally shared, systems competition in terms of antitrust legislation will not result in the erosion of the competitive system in Europe. The landscape of European firms will stay as diversified as it is, and due to the wider markets, the European economy would be even closer to the ideal of a competitive equilibrium among private firms than when the borders were harder to penetrate than today. Systems competition would support the private competitive system.

If, instead, the other view that the individual country gains by creating global players prevails, *ordo liberal* antitrust policies would not survive a process of systems competition. Systems competition in antitrust legislation would not support the private competitive system but would result in a different kind of equilibrium whose properties are not very well understood by economists.

This book does not take an ultimate stand on this issue. However, there is a problem, and the purpose of this final chapter is to make the reader aware of it and trigger off further discussion. After reviewing the textbook oligopoly model, alternative model assumptions will be presented in the following sections which support the one view and then the other, and an attempt will be made to describe what would happen if the national authorities allowed their companies to engage in a race for good starting positions by helping them to become global players and by quickly dismantling their antitrust laws. We will see that the allocative outcome of such a race will not be that bad, after all.

## REGULATING THE MONOPOLY

Before analysing the competition between competition rules, it will be useful to briefly review the *ordo liberal* arguments for putting

restrictions on setting up cartels and on company mergers. Restricting cartels is necessary because competitive firms always have an incentive to merge to the disadvantage of the consumer. The cartel reduces the quantity it sells and thus raises prices. Whether this will cause revenue to rise or fall is not clear. However, costs will fall because of the reduction in sales and production. The consumers get the worst of the bargain. They pay higher prices, and their surplus becomes smaller. On balance, setting up a cartel is a loss for society because the cartel gains less than the consumers lose. *Ordo liberal* policy prevents this from happening by prohibiting cartels and mergers.

To reserve the complications for the analysis of systems competition, the analysis begins with the simplest version of the textbook monopoly model with  $n$  identical firms, linear demand, constant marginal cost  $c$ , and homogeneous products. The individual firm  $i$  chooses its quantity supplied,  $x_i$ , under the Cournot-Nash assumption that it has no influence on the quantities planned by other firms but can influence the common market price  $P$  to a limited extent through its own actions. A market equilibrium is reached when the market clears and all quantities are chosen so that no supplier has any incentive to change its quantity.<sup>2</sup> The goal of firm  $i$  is to maximize profits,

$$\max_{x_i} P(X) \cdot x_i - cx_i, \quad i = 1, \dots, n,$$

where

$$X = \sum_{i=1}^n x_i$$

is the total quantity sold. Given this quantity, a linear demand function determines the market price

$$P(X) = b \cdot (K - X) + c; \quad b, K, c = \text{const.} > 0, \quad (8.1)$$

where  $-b$  is the slope of the demand curve and  $K$  the quantity that would be sold in a competitive market. To simplify later steps of the

<sup>2</sup> As Kreps and Scheinkman (1983) have shown, the Cournot-Nash model also can be substantiated very well in a two-step game structure, where first the capacities are determined, and then the prices are set as in a Bertrand competition.

analysis, the demand curve has been expressed in a somewhat unusual mathematical form, showing how the price is composed by the marginal cost  $c$  and a mark-up which depends on the free range up to the competitive quantity which is not covered by the actual output,  $K - X$ .

With perfect competition it would be true that

$$P(X) = c \quad (\text{perfect competition})$$

and therefore

$$X = K. \quad (\text{perfect competition})$$

However, with a finite number of firms,  $n$ , competition is not perfect. In a Cournot oligopoly the profit maximizing conditions for problem (8.1) are

$$P(X) + P'(X)x_i = c, \quad i = 1, \dots, n. \quad (8.2)$$

These say that the marginal revenue equals the marginal cost of production. The marginal revenue from the sale of one more unit of the product is equal to the price at which this unit can be sold minus the reduction in revenue resulting from the fact that the sale of the extra unit is only possible if the infra-marginal units are also sold at a lower price. It is expressed by the term  $P'(X)x_i$  which is negative because  $P' < 0$ .

The reduction in revenue with the infra-marginal units obviously implies that  $P(X) > c$ ; that is, that price is above marginal cost and the quantity sold is below the competitive quantity  $K$ , indicating a welfare loss. The effect is stronger the larger the market share of the individual firm because the share of the total detriment resulting from the price reduction that the individual firm has to bear is larger. This can be seen at once when it is considered that (8.2) implies a symmetrical equilibrium in which

$$n x_i = X, \quad i = 1, \dots, n.$$

Equation (8.2) then becomes

$$P(X) + \frac{1}{n} P'(X) \cdot X = c \quad (8.3)$$

where  $1/n$  is the market share of one firm. Applying equation (8.1), it follows from (8.3), with a little transformation, that aggregate output is

$$X = \frac{1}{\frac{1}{n} + 1} K. \quad (\text{Cournot oligopoly}) \quad (8.4)$$

This expression shows that, with linear demand, the quantity sold is a falling function of the market share of the single firm. In the extreme case of a monopoly,  $1/n = 1$ , the quantity sold is half the competitive quantity,  $X = K/2$ , and in the other extreme where the market share approaches zero,  $1/n \rightarrow 0$ , it is equal to the competitive quantity,  $X = K$ .

The deeper reason for this implication of alternative market shares is a negative pecuniary externality the single firm imposes on other firms by forcing them to lower their price if it decides to increase its sales by a unit. The smaller the market share the larger is this pecuniary externality and the larger is the single firm's incentive to deviate from the monopoly quantity that would maximize the joint profits of all firms: the better functions the market economy.

Unfortunately, the externality can be internalized if firms merge or establish a cartel. With perfect collusion, there is no externality, and with a linear demand curve and constant marginal costs, only half the competitive quantity is produced.

Figure 8.1 illustrates these relationships. In a price-quantity diagram it shows the marginal cost curve  $c$ , the demand curve  $P(X)$  and the marginal revenue curve for the cartel. The last mentioned graphs the left-hand side of equation (8.3) for the case where  $n = 1$ . With the particular linear demand curve (8.1), the marginal revenue curve starts at the same place on the ordinate as the demand curve (i.e. at point A) and it is twice as steep as the latter. In the cartel optimum, F, the marginal revenue equals the marginal cost and the mark-up above the marginal cost is BF. With an oligopoly of five suppliers, on the other hand, the mark-up is only CE and the quantity sold exceeds the monopoly quantity by the amount IH.

Setting up the cartel benefits the suppliers because profit increases by the area FEL (since the revenue can be measured by the area under the marginal revenue curve and cost by the area under the marginal cost curve). At the same time social welfare falls. Social welfare can be defined as the sum of all economic rents, which are equal to the

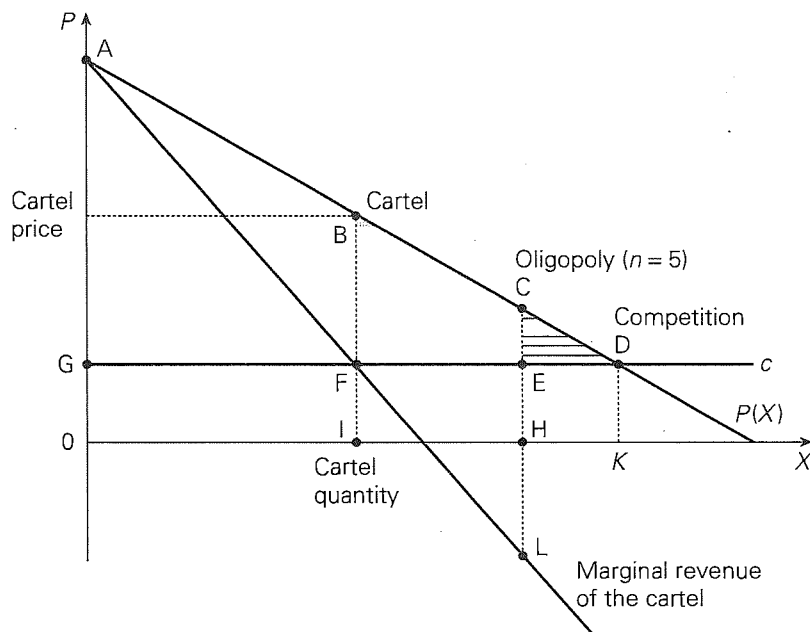


Figure 8.1 The ordo liberal creed.

difference between the consumers' maximum willingness to pay, the area under the demand curve, and the production costs which are given by the area under the marginal cost curve. With perfect competition, where price equals marginal cost, social welfare is measured by the triangle ADG, with the oligopoly (here with five members) it is measured by the area ACEG, and with the cartel it is measured by the area ABFG. Establishing a cartel obviously brings about a reduction in the total surplus of BCEF, although profit, which is part of this total, increases. The cake is smaller but the producers can cut themselves an absolutely bigger piece of it.

The economic inefficiency of setting up a cartel is the basis of the ordo liberal creed. The economy can be protected from the damaging effects of monopolizing the market by means of effective antitrust controls. In the present example, antitrust regulation would prevent welfare from falling by the area BCEF.

## THE ADVANTAGE OF FORMING A COMMON MARKET

Let us now try to mimic with the model set up above the creation of a common European market. Suppose that all countries followed ordo liberal policies before European integration, and that market segmentation is now abolished. Creating the common market will intensify competition, given the national antitrust laws, and it may lead to an abolishment of these laws. These two effects will be studied one by one. This section studies the implications of joining the markets, given the antitrust laws, and the remainder of the chapter is devoted to the case of abolishing antitrust laws, given that a common market has been created.

Suppose the given set of  $n$  firms is divided into  $z$  identical markets or countries operating in autarchy, each containing  $n/z$  of the total of  $n$  firms. Suppose further that the market-specific demand curves are identical and given by the functional form

$$P(y_j) = b \cdot (K - zy_j) + c; \quad b, K, c = \text{const.} > 0, \quad j = 1, \dots, z,$$

where  $y_j$  is quantity produced in market  $j$ . Aggregating these demand curves 'horizontally' generates the overall demand curve described with (8.1), where

$$X = \sum_{j=1}^z y_j.$$

As there are  $n/z$  firms per market and each market's competitive quantity is  $K/z$  it follows by straightforward application of the above reasoning that in each of the separate markets the supply is given by

$$y_j = \frac{1}{\frac{z}{n} + 1} K/z, \quad j = 1, \dots, z, \quad (\text{autarchy, Cournot-Nash})$$

such that the aggregate quantity sold is

$$X = \frac{1}{\frac{z}{n} + 1} K. \quad (\text{autarchy, Cournot-Nash})$$

This equation coincides with (8.4) when  $z = 1$ , but in general it indicates a smaller quantity. The larger the number of separate markets, the smaller is the aggregate quantity supplied. Inversely, the following proposition is obvious.

**Proposition 8.1:** *Suppose there is initially a group of identical markets between which no trade is allowed. Creating a common market, given the number of firms, increases aggregate output and welfare because the market share of each single firm falls and competition becomes more intense.*

### THE ORDO LIBERAL EQUILIBRIUM IN SYSTEMS COMPETITION

The welfare gain from creating a common market, as stated in proposition 8.1, was derived under the assumption that the total number of firms,  $n$ , is constant, which basically means that the national antitrust laws remain intact, prohibiting the formation of larger conglomerates. The interesting question, however, is whether this assumption is justified. What if antitrust policies will themselves react to the creation of a common market?

This is the problem of where a competition of competition rules will lead. Will this type of competition between the legislators bring about an ordo liberal equilibrium where each parliament prohibits cartels and mergers, or will another kind of equilibrium result where the single countries seek advantages by dismantling their antitrust laws, perhaps even before the others do so? As explained above, this chapter cannot give an ultimate answer to this question. What it can do, however, is outline which kinds of argument would support an affirmative answer and which ones would support a denial. Let us begin with the affirmative view.

Assume again that initially there are  $n$  firms and that these firms are equally distributed over  $z$  countries between which free trade in goods is allowed. Let  $n$  be sufficiently large so that there are at least two firms per country. The first  $m$  firms are located in various countries where the ordo liberal economic policies are in place. The remaining  $n - m$  firms belong to a certain country, say 'Germany', which lifts the prohibition on mergers such that there are  $m + 1$ ,  $m + 1 < n$ , firms in

total after the German conglomerate has been formed. Quantities remain flexible and there are no commitment possibilities.

The purpose of this exercise is to find out whether Germany will be able to gain from dismantling its merger prohibition. If it does, an ordo liberal equilibrium in systems competition does not exist. However, if Germany cannot gain by allowing mergers, it will not, in fact, do that, and systems competition is compatible with an ordo liberal equilibrium.

If they are allowed to form a conglomerate, firms will actually make use of this possibility, because, given the behaviour of other firms, they can internalize part of the pecuniary externality and increase their profits by reducing their supply. However, the conglomerate will be indistinguishable from the other firms and produce the same output as each of the other firms does. A new equilibrium will emerge, where the joint output will be

$$X = \frac{1}{\frac{1}{m+1} + 1} K. \quad (\text{one country allows mergers})$$

Obviously, as  $m + 1 < n$ , the joint output will be smaller than in the case where all antitrust laws remain in place, as indicated by (8.4), and Germany's market share will decline from  $(n - m)/n$  to  $1/(m + 1)$ .

As the merger reduces both the market share of the previous  $n - m$  German firms and aggregate supply, it is clear that German welfare falls. This country continues to receive  $1/z$  of the aggregate consumer surplus, and it would receive  $1/z$  of the aggregate profit if the market share of its firms had not declined. Thus, national welfare would decline in proportion to the decline in the sum of all rents even if the market share had stayed constant. Given, however, that the share in profits that accrues to Germany shrinks, national welfare falls for yet another reason. Thus, the condition for an ordo liberal equilibrium in systems competition is satisfied. It does not pay to deviate from a situation where ordo liberal policies are pursued in all countries.

**Proposition 8.2:** *If, in a symmetrical confederation of countries, private firms follow Cournot-Nash strategies, it is not in the interest of a single country to abandon its antitrust law and allow its*

*national firms to merge. Systems competition brings about an ordo liberal equilibrium where all countries maintain their antitrust laws despite the creation of a common market.*

## ORDO LIBERAL POLICY VS. FIRST-MOVER ADVANTAGES

This was the affirmative view, as is held by the ordo liberal economists. Politicians and company leaders doubt this view, however. They insist that the common European market will bring about national conglomerates and that it is important to form such conglomerates earlier than others. Obviously, they have first-mover advantages in mind when they argue that national conglomerates should be formed and antitrust laws should be generously interpreted or even abandoned to pave the way for the creation of strong international competitors. 'A country will not be able to succeed in a globalized world unless it is able to create at least some global players,' is a statement of a recent German economics minister which makes the position utterly clear.

First-mover advantages result from strategic decisions which can credibly and irrevocably be made, forcing players who come later to take these decisions as given and allowing them merely to react. The necessary credibility may result from sinking fixed costs, subscribing to binding legal contracts or receiving public support, which makes it useless for the competitors to challenge these decisions.

Sinking fixed costs may result from putty-clay technologies or the prevalence of binding, long-term employment contracts. They are compatible with the above assumption of constant variable cost if it is assumed that the production decision is made initially and cannot easily be changed thereafter, while the production cost occurs periodically.

An important example of binding legal contracts are the so-called strategic alliances which have gained much importance in recent years. Strategic alliances involve mutual promises of quantity constraints intended primarily to be binding for the alliance partners but which may be even more important as signals to rivals of irrevocable quantity decisions.

Government policy decisions aimed at the formation or preservation of strong international players are also frequent phenomena. Think of national aircraft or spacecraft industries which are of military import-

ance or of new technology clusters which governments want to set up so as to foster technological progress. The topic has a substantial practical importance in the context of privatized state firms. Often such firms are not dissolved into a set of competitive companies as they should be under the ordo liberal creed but kept intact and supported by explicit government actions. Examples are the German state banks (Landesbanken), which enjoy the privilege of unlimited state warranties; Electricité de France, which occupies a publicly sanctioned and subsidized state monopoly position in France; Deutsche Post, which is building up an international logistic network and which the government wants to grow fat before competitors are allowed in; or Spanish Telefonica, which received a hidden subsidy of many billions of euros by not being forced to pay for UMTS licences and which therefore was able to buy such licences on a large scale in other countries.

In the analysis that follows it is assumed that parliaments design their competition policies so as to maximize national social welfare, choosing between an ordo liberal policy and a first-mover policy. An ordo liberal policy involves the prohibition of cartels or the dismantling of privatized companies. A first-mover policy involves creating national conglomerates, abolishing antitrust laws, providing state subsidies and privileges, preserving state protection after privatization and the like, including measures to credibly signal irrevocable capacity and supply decisions. For simplicity the discussion will typically be phrased in terms of maintaining and abolishing antitrust laws, but the reader should keep these other strategies in mind.

It has been assumed that when countries' borders are closed all parliaments will follow ordo liberal strategies, as suggested by the introductory model. The question is whether such strategies will maximize national welfare when the borders are opened such that there is a common international market for all the firms of an industry branch.<sup>3</sup> A positive answer to this question is necessary for the existence of an ordo liberal equilibrium in the competition between competition rules and, as was shown (proposition 8.2), such an answer emerges if no

<sup>3</sup> In what follows, national welfare will be defined as the sum of national profits and consumer surpluses. Little would change if it was assumed that the national parliament maximizes the profits of the domestic firms rather than national welfare, which Olson's (1965) theory of the political dominance of the producers' interests would imply.

credible commitment strategies are available for a country such that all countries play the Cournot game. Things are different, however, if commitment strategies of the kind discussed in this section are available.

*Stackelberg position through lifting  
the prohibition on cartels*

Suppose Germany lifts its ban on cartels and helps its firms to credibly commit to their supply decisions. In this case German firms can occupy the position of a Stackelberg leader, while *ordo liberal* attitudes in the other countries force the firms of these countries to take on follower strategies. The Stackelberg leader knows how its rivals would react to its own behaviour and uses this knowledge to arrive at the best possible, profit maximizing, decision. Unlike the Cournot model, where all the players are in symmetrical positions because they cannot commit to irrevocable supply decisions, the leader does not assume that it must adapt to the quantity set by the others. Instead it knows that it can confront the others with its own irrevocable production capacity and, to this extent, present them with a *fait accompli*.

The behaviour of the firms in the other countries which can only react must be examined next in order to determine the optimal policy of the Stackelberg leader. This behaviour will be determined by the rules set out in the previous section, i.e. by condition (8.2). Now, though, the aggregate sales volume, which according to equation (8.1) determines the product price, is given by

$$X = X_R + X_G \quad (8.5)$$

where

$$X_R \equiv \sum_{i=1}^m x_i \quad \text{and} \quad X_G \equiv \sum_{i=m+1}^n x_i \quad (8.6)$$

are the total quantities supplied and the subscripts G and R stand for Germany and the rest of the countries. As before, there are  $n - m$  firms in Germany and  $m$  firms in the rest of all countries. Sticking to the basic assumptions of the initial model and using (8.1), it follows

from (8.2) that the supply of an individual firm which is located in the other countries is determined by the equation

$$x_i = K - X \quad \forall i = 1, \dots, m. \quad (8.7)$$

Thus, the individual firm which behaves as a Cournot-Nash follower produces a quantity which is just equal to the difference between the competitive quantity and the quantity produced by all firms, including itself. Given the quantity supplied by all other firms, the individual firm can still vary the total supply within a certain range up to the competitive quantity. As it is faced with a decision problem like that of a monopolist it will cover half of this range with its supply – that is, it will leave a gap between the total quantity and the competitive quantity equal to the quantity it supplies itself.

Summing all  $m$  equations of type (8.7), and taking (8.5) and (8.6) into account, gives the total supply of the firms in the rest of the countries which do not allow a cartelization as

$$X_R = \frac{1}{\frac{1}{m} + 1} (K - X_G). \quad (8.8)$$

This equation is formally similar to (8.4), except that the free production range up to the competitive quantity is reduced by the quantity covered by the Stackelberg leader, the German cartel. The Cournot players produce a quantity which covers a fixed share,  $1/[(1/m) + 1]$ , of this free range which depends on their number as in (8.4).

Knowing this reaction pattern, the German cartel can choose its quantity  $X_G$  so as to maximize its profits. The decision problem of the German cartel is

$$\begin{aligned} & \max_{X_G} P(X) X_G - c X_G \\ & \text{subject to (8.5) and (8.8).} \end{aligned} \quad (8.9)$$

Applying the demand function (8.1), (8.9) can be written as

$$\max_{X_G} X_G b (K - X_G) \frac{1}{1 + m}.$$

From the first-order condition of this optimization problem it follows that

$$X_G = \frac{K}{2} \quad (8.10)$$

which means that the German cartel provides half the competitive quantity just as a monopolist does. The firms of the rest of the countries, which are not in a cartel, comply with rule (8.8), and thus, because of (8.10), supply a quantity given by

$$X_R = \frac{1}{\frac{1}{m} + 1} \cdot \frac{K}{2}.$$

The total quantity supplied therefore is

$$X = X_G + X_R = \frac{1 + 2m}{1 + m} \cdot \frac{K}{2}. \quad (\text{Stackelberg}) \quad (8.11)$$

### National welfare gain

Taking a Stackelberg position can increase the 'German' profits and the 'German' welfare but it does not have to. Because of the revealed preference theorem, the profits increase when the German quantity sold changes compared to the Cournot-Nash game, whatever the direction of the change is. However, the consumer surplus only rises when the price falls and this requires there to be higher total sales. Note that, because of the Cournot-Nash behaviour of the other firms, the aggregate quantity will always move in the same direction as the German quantity. When taking a Stackelberg position results in the same aggregate quantity sold as in the case where the antitrust laws are retained, then neither German profit nor German welfare changes.<sup>4</sup> When the aggregate quantity sold falls, the German profit increases but the consumer surplus falls. Only if the quantity sold increases when a cartel is established can an increase in both the profit of the German firms and the German consumer surplus be expected, providing

<sup>4</sup> The profits and the welfare of the other countries also remain constant.

strong incentives for the German legislator to abolish the antitrust law.

The change in the aggregate quantity sold as a result of establishing a cartel is the net effect of two counteracting forces. On the one hand, the cartelization of the German firms leads to a reduction in the number of competitors in the international market and this tends to reduce the aggregate quantity sold. This effect is similar to the one that makes it wise not to permit cartelization in a closed economy. On the other hand, in an open economy, the Stackelberg leader may be able to expand sales at the expense of his rivals, increasing the aggregate quantity sold. This effect resembles the one emphasized by the strategic trade literature.<sup>5</sup> If there are sufficiently many German firms initially relative to the number of firms in the rest of the world, the first effect will dominate, and the aggregate quantity sold will fall. If, on the contrary, there is only *one* German firm initially, and if this firm is now able to position itself ahead of the other firms – that is, to change from a Cournot-Nash player to a Stackelberg player – there will certainly be an increase in the aggregate quantity. In which direction the quantity supplied will change when the number of German firms is between the two extremes is not obvious.

Letting  $X_A$  stand for the quantity sold which results when all antitrust laws are in force and  $X_S$  stand for the quantity which, in the case of the Stackelberg game, results from abolishing the German antitrust law, then, after a little transformation,

$$X_S \begin{cases} > \\ = \\ < \end{cases} X_A \Leftrightarrow m + 1 \begin{cases} > \\ = \\ < \end{cases} n - m \quad (8.12)$$

follows from (8.4) and (8.11). The result says that establishing a cartel of German firms leads to an increase in total sales, and thus to a fall in price, when the number of firms in the other countries,  $m$ , is larger than, or equal to, the number of German firms before the cartel was set up,  $n - m$ . Only when in the initial situation there were at least two more firms in Germany than there were in the rest of the world will the quantity sold fall and the price level rise. However, if we stick to the basic assumption of identical countries, this case is not possible here and, of course, it is not realistic where a country like Germany is

<sup>5</sup> See Brander and Spencer (1981).

being considered. Thus the national consumer surplus unambiguously increases as a result of setting up the cartel. The following consequences emerge.

**Proposition 8.3:** *In autarchy each country maximizes its own welfare when it imposes an effective antitrust regulation. However, once the borders are opened, it is in the national interest of any single country to help its national firms to form a cartel and to credibly commit to a common supply decision. The cartel will take on a Stackelberg leadership position if the other countries continue to stick to ordo liberal policies. The leadership position results in an increase of national welfare by lowering prices and shifting profits from foreign to domestic pockets. Therefore, an ordo liberal equilibrium does not exist in systems competition when countries can create national conglomerates and help them to credibly commit to their supply decisions.*

The result just derived is a negative one. It says that a country will take on a Stackelberg position if the others do not, proving that no ordo liberal equilibrium in systems competition exists. It does not describe the equilibrium which will emerge instead. It should probably be assumed that the other countries will also get rid of their antitrust laws, form national conglomerates and help these conglomerates credibly commit to their supply decisions. In this case the different national cartels interact in a more complicated fashion, as will be analysed next.

## THE DEREGULATION RACE

Suppose now that all countries consider the possibility of helping their national companies to attain credible leadership positions. The advantage of taking on leadership positions is higher the earlier the commitment is made, because countries that decide later have to take the previous decisions as given. Clever governments will first abolish their antitrust laws and help establish strong national conglomerates, others will follow after a delay, and some countries will not be able to overcome internal political obstacles and to act before many other countries have done so. In such a situation, it pays to be quick in order to achieve the position of a Stackelberg leader. A country which, thanks to rapid deregulation, is able to establish universally respected con-

glomerates of firms more quickly than other countries can has created facts which the firms of all successive countries must take into account in planning their own capacities. Speed is important. First come, first served – but those who come second or third may still be better off than those who come even later because they, too, can create unalterable facts for the latecomers. There is more than just one Stackelberg leadership position. The later you come, the more ground is already occupied and the smaller the position that you must be content with. A deregulation race starts because the starting position will decide long-term success.

### *A sub-game perfect equilibrium*

The order in which the countries' governments make the decision about repealing the national antitrust law depends on national features which are not considered here and, indeed, are not important. What is important is to know how the parliaments decide when it is their turn and how the private firms behave as a result. The parliament has three choices.

- (1) It may repeal its antitrust law immediately.
- (2) It may repeal its antitrust law later, after other parliaments have done so.
- (3) It may decide never to repeal its antitrust law.

Firms also have similar decision opportunities, because setting up a cartel is a right, but not a duty. If the national antitrust law is not repealed and ordo liberal attitudes continue to prevail, the firms in the country are not in a position to make binding quantity agreements and thus they behave like Cournot-Nash competitors, adapting themselves to the quantities fixed by the national cartels of the other countries. But once the national antitrust law is repealed, the firms of a country

- may immediately build a national cartel,
- may decide to build such a cartel later or
- decide not to cartelize at all.

As explained above, it will be assumed that building a cartel is equivalent to adopting a commitment strategy since there are binding contracts between the cartel members ('strategic alliances') which serve as credible signals to others, or since the government will credibly support the

cartel or conglomerate with protective policy decisions. Again, countries are assumed to have the same size and the same number of firms with the same constant average and marginal cost  $c$ . Let  $m$ ,  $m \geq 2$ , now be the number of firms per country. The buyers are distributed equally over all countries.

A deductive solution to the game structure just described is extremely difficult because of the large number of possible decisions. Another method will therefore be used here. We start with a conjecture about the behaviour of the parliaments and firms, (a), continue with a recursive calculation of the details of the game among the firms which results from the parliaments' conjectured decisions, (b), and conclude with the proof that no parliament can make its country, and no firm can make its owners, better off when they make policy decisions different from those conjectured, (c).

### (a) Conjecture

The conjecture is that each national parliament uses its scope for decision making to repeal the antitrust law as soon as the chance arises and as long as there is at least one other parliament that has not yet decided to repeal the law. The repeal makes it possible for the national firms to establish cartels and to credibly set the quantities they sell in advance of other firms in order to shift profits to their own pockets. It is conjectured that only the parliament that is the last to decide does not repeal, because by doing so it will not bring about a profit transfer but only a reduction in the consumer surplus. It is also conjectured that the firms immediately use the right to establish a national cartel as soon as their parliament allows them to.

### (b) Calculation

In order to analyse the behaviour of the firms in detail, given the conjectured behaviour of the parliaments, the decision situation of the players must be looked at recursively. Technically speaking, the task is finding a sub-game perfect solution for the quantity planning of the firms. The players are the firms and the parliaments of the  $z$  countries. The countries will be numbered in reverse order of their decision to repeal the national antitrust law, where the last country, which is conjectured to retain the law, will be number 1. The last country will

produce the quantity  $x_1$ , the second last  $x_2$ , the third last  $x_3$ , and so on. The total quantity that the  $i$  last countries produce is  $X_R^i$  and the total quantity that the  $z-i$  previous countries produce is  $X_A^{z-i}$ .

For the moment, it will still be assumed, in accordance with the conjecture described, that the firms use the right to form a cartel as soon as they are allowed to. It is not a question of whether they will use it, but how they use it when they do.

The firms of the last country, 1, are confronted with the fixed quantity  $X_A^{z-1}$ ,  $X_A^{z-1} < K$  given by the earlier players, where  $K$  is once again the competitive quantity – that is, the quantity at which the international demand curve cuts the horizontal marginal cost curve. The firms in country 1 play a Cournot-Nash game because of the cartel ban and thus choose, analogously to (8.8), the aggregate quantity

$$X_R^1 \equiv x_1 = \frac{1}{\frac{1}{m} + 1} (K - X_A^{z-1}) \quad (8.13)$$

where  $m$  is now the number of firms in country 1. The second last country, 2, has, as conjectured, a cartel which is confronted with the given aggregate quantity chosen by the previous cartels  $X_A^{z-2}$ ,  $X_A^{z-2} \leq X_A^{z-1}$ . The cartel of country 2 knows from (8.13) and

$$X_A^{z-1} \equiv x_2 + X_A^{z-2} \quad (8.14)$$

that it can influence the quantity chosen by the firms of country 1. It solves the maximization problem

$$\begin{aligned} \max_{x_2} P(X) \cdot x_2 - cx_2, \quad X = X_R^1 + x_2 + X_A^{z-2} \\ \text{subject to (8.13) and given } X_A^{z-2}. \end{aligned}$$

Because of (8.1) and (8.14)

$$x_2 = \frac{1}{2} (K - X_A^{z-2}) \quad (8.15)$$

follows from this, which then determines

$$X_R^2 \equiv x_2 + X_R^1 \quad (8.16)$$

The cartel of the third last country is faced with the fixed quantity  $X_A^{z-3}$ ,  $X_A^{z-3} \leq X_A^{z-2}$ , given by the  $z-3$  earlier cartels and knows from (8.13), (8.15) and

$$X_A^{z-2} \equiv x_3 + X_A^{z-3}$$

how it can influence the behaviour of the succeeding countries with its quantity decision. It solves the maximization problem

$$\begin{aligned} \max_{x_3} P(X) \cdot x_3 - cx_3, \quad X = X_R^2 + x_3 + X_A^{z-3} \\ \text{subject to (8.13) and (8.15), given } X_A^{z-3}, \end{aligned}$$

which, because of (8.1), (8.15) and (8.16), determines

$$x_3 = \frac{1}{2}(K - X_A^{z-3}) \quad (8.17)$$

and therefore also

$$X_R^3 \equiv x_3 + X_R^2.$$

The chain of decisions continues in a similar fashion. The cartel of the  $i$ th last country solves the problem

$$\max_{x_i} P(X) \cdot x_i - cx_i, \quad X = X_R^{i-1} + x_i + X_A^{z-i},$$

once again subject to the solutions for all succeeding countries and given the decisions of all preceding ones as summarized by  $X_A^{z-i}$ . It chooses the quantity

$$x_i = \frac{1}{2}(K - X_A^{z-i}) \quad (8.18)$$

which determines

$$X_R^i \equiv x_i + X_R^{i-1}.$$

Equation (8.18) also holds for the cartel of the first country that makes a decision,  $i = z$ , where, of course,

$$X_A^0 = 0$$

The simple decision rule in such a sub-game perfect equilibrium is that country  $i$ ,  $i = 2, 3, \dots, z$ , covers with its production half the range  $K - X_A^{z-i}$  between the competitive level and the quantity given by the previous cartels.

This decision rule can once again be understood by comparing it with the profit maximizing decision rule of a monopolist. The monopolist, too, supplies exactly half of the range available to him when the demand curve is linear. The difference from the monopoly case is only that the range no longer starts at zero but at the quantity given by the previous cartels, and that the perceived demand curve is flatter because it also takes account of the fact that the cartel can partly drive out the quantities of the following countries if it decides to expand its own quantity. As the slope of the perceived demand curve, given the competitive quantity  $K$  where the demand curve intersects the marginal cost curve, has no influence on the quantity planning, the number of countries that follow plays no role for a particular cartel's decision. In every case, it will itself cover half of the range still open to it.

Country 1 is the only exception to the rule that the quantity supplied is exactly half the still available range up to the competitive quantity because no cartel will be set up in that country. The oligopoly of the  $m$  firms in this country also covers a fixed share of the range  $K - X_A^{z-1}$ , but this share is  $m/(1+m)$  which, because  $m \geq 2$ , is more than  $1/2$  (at least  $2/3$ ). Interestingly, the number of firms in this country has no influence on the prior cartel decisions although the total sales quantity is an increasing, and the product price is a falling, function of this number. An increase in the number of firms in country 1 would only make the perceived demand curves of the prior cartels flatter, but it would not influence those cartels' profit maximizing quantities. Even if country 1 permitted a monopolistic policy with  $m = 1$ , this would have no influence on the quantity planning of the previous cartels. This can be seen easily as  $x_2$ ,  $x_3$  and  $x_i$  in (8.15), (8.17) and (8.18) are independent of  $m$ .

### (c) Proof

It is now time to prove that the conjectured behaviour of the national parliaments and firms does actually maximize their national welfare. Consider the parliaments first. There are, in principle, three options

open to the parliament of a particular country at the exogenously fixed time of decision. It can repeal the antitrust law. It can decide to enter the time hierarchy after a country that comes later and then repeal the law. And it can refrain from repealing the law at all. For the moment, it is still assumed that the firms use the right to set up a cartel as soon as they are allowed to.

Let us begin once more with the parliament which decides last, and which has the number 1. This parliament does not have the three options, because there is no other parliament whose decision it can wait for. It can only choose between repealing and retaining its antitrust law. It was conjectured that it retains the antitrust law.

This conjecture is not trivial. On the one hand, the situation of this country has a certain similarity with that of a country in autarchy whose firms face a competitive range of size  $K - X_A^{z-1}$  and which should stick to *ordo liberal* policies so as to avoid the welfare loss from setting up a monopoly. On the other hand, allowing for a national cartel has the advantage of being able to gain from a price increase imposed on the consumers of all countries.

To find the answer, a formal analysis is necessary. Suppose that country 1 repeals its antitrust law and that its firms set up a cartel. The firms decide like a monopolist would in relation to the remaining range; that is, they fix a quantity  $(K - X_A^{z-1})/2$  rather than  $(K - X_A^{z-1}) \cdot m/(1 + m)$ . This means a price increase,  $\Delta P$ , which lowers the country's consumer surplus and increases its profits. The key question for the parliament is which effect predominates. Only if the former does, such that there is a net welfare loss, will our conjecture that the country does not repeal its antitrust law be correct.

For the size of the loss of consumer surplus,  $\Delta V$ ,

$$\Delta V > \Delta P \cdot \frac{1}{z} \left[ X_A^{z-1} + \frac{1}{2} (K - X_A^{z-1}) \right] \quad (8.19)$$

holds as can easily be concluded, since the share  $1/z$  of the consumers lives in country 1 and since the right-hand side of (8.19) contains the part of the loss of consumer surplus that results from the price increase with the given (new) quantity, but not the part that results from a fall in quantity with a given (old) price. Considering that the optimal decision rule of the cartels according to (8.18) implies

$$K - X_A^{z-1} = \frac{1}{2^{z-1}} K \quad (8.20)$$

it follows from (8.19), after a little transformation, that

$$\Delta V > \Delta P \cdot \frac{1}{z} K \left( 1 - \frac{1}{2^z} \right). \quad (8.21)$$

On the other hand, taking (8.20) into account,

$$\Delta G < \Delta P \cdot \frac{1}{2} (K - X_A^{z-1}) = \Delta P \cdot \frac{1}{2^z} K \quad (8.22)$$

holds for the increase in the firms' profits,  $\Delta G$ , because the right-hand side of (8.22) only covers the profit increasing effect of a price increase with the given (new) quantity, and not the profit reducing effect that results from a reduction in quantity with a given (old) price. It obviously follows from (8.21) and (8.22) that  $\Delta V > \Delta G$  when

$$\Delta P \cdot \frac{1}{z} K \left( 1 - \frac{1}{2^z} \right) > \Delta P \cdot \frac{1}{2^z} K$$

or, what amounts to the same thing, when

$$2^z > 1 + z.$$

Since this condition is satisfied for all  $z \geq 2$  it is clear that country 1 will, as assumed, really not repeal its antitrust law. The repeal would increase the profits but would lower the sum of the national consumer and producer rents.

Next, whether country 2 could improve its position by choosing a different policy must be examined. Let us first consider the case where it retains its antitrust law while country 1 does so, too. In this case, country 2 is clearly worse off than when it repeals its antitrust law. It is sufficient here to outline the proof because the result can be derived analogously to proposition 8.3. In the case of a cartel ban, the firms of country 1 and country 2 are in the same situation as the  $n$  firms in the whole economy which was considered when deriving this proposition. The only difference is that the range available to the firms is narrowed by the quantity  $X_A^{z-2}$  already given. Taking into account that  $2 \cdot m$  rather than  $n$  firms take part in the Cournot game, it is found analogously to (8.4) that

$$X_R^2 = \frac{1}{\frac{1}{2m} + 1} (K - X_A^{z-2}) \quad (\text{Cournot-Nash})$$

and, analogously to (8.11), it can be worked out for the case where country 2 is the Stackelberg leader that

$$X_R^2 = \frac{1 + 2m}{1 + m} \cdot \frac{1}{2} (K - X_A^{z-2}). \quad (\text{Stackelberg})$$

Analogously to (8.12), it is immediately obvious from the comparison of the two magnitudes that the last two countries taken together produce a bigger quantity with the Stackelberg solution and, because of the revealed preference theorem, this indicates both a higher profit and a higher consumer surplus for country 2. Country 2 will therefore not renounce its Stackelberg position when it believes that country 1 will continue to play a Cournot game.

A fortiori, country 2 will not renounce its Stackelberg position when doing so would lead to country 1 preceding it and taking the Stackelberg position itself. Since the Stackelberg leader chooses a higher quantity and makes a larger profit than its followers and since the change of places will affect neither the aggregate quantity supplied nor the price the consumers have to pay, it certainly never pays to leave the leadership position to another country. Country 2 will thus also behave as conjectured, that is, it will repeal its antitrust law when it can do so.

Let us now look at country 3, which is the country that can decide before country 2. Its situation is clear. If it does not use its opportunity to decide and repeals its antitrust law so late that country 2 precedes it, its firms experience a reduction in profits. Changing places does not alter the aggregate quantity supplied, the sales price or the consumer surplus. However, it cuts the sales quantity and the profit of the domestic firms in half. If the country does not repeal its antitrust law at all, it slips behind even country 1. Country 2 will now behave as country 3 would otherwise have done, and country 1 as country 2 would have done, thus taking a Stackelberg position in relation to country 3. Because, as was shown, country 2 would lose if it changed places with country 1 by not repealing its antitrust law, country 3 would lose a fortiori. Country 3, too, will therefore repeal its antitrust law as quickly as possible and use the decision opportunity it has been offered.

The conclusion we can infer for country 4 and the countries which are able to decide even earlier is obvious. Each individual country will behave exactly as conjectured in (a) because any other economic policy would lead to lower national welfare.

Finally the conjecture that firms cartelize as soon as they can has to be proved. This is trivial since the firms' decision possibilities, given the decisions of their parliaments, are similar to the three decision possibilities of the parliaments. The firms can set up the cartel, they can postpone the decision to set up the cartel until after the establishment of another cartel, or they can choose not to set up a cartel at all. As postponing and doing without a cartel would, as just shown, reduce profits, the firms in each country will set up a cartel as soon as the national antitrust law is repealed.

**Proposition 8.4:** *The competition between competition rules is a race to repeal the national antitrust law as quickly as possible. The aim is to give the country's own economy a lead in achieving an early Stackelberg position, which it then exploits, as soon as it is allowed to. The quantity sold and the profit of the firms are smaller the later in the succession of countries this country decides to repeal its antitrust law. All countries except the last one repeal their antitrust laws. The last country retains its law and forces its firms to behave like Cournot-Nash players. The deregulation race between the national parliaments just described is a sub-game perfect equilibrium in systems competition.*

## AN UNCOMFORTABLE PROPOSITION

The result derived confirms the judgement that, once the borders between countries are opened and competition between competition rules starts, the day of ordo liberalism is over. The question now is how is this result to be judged in allocative terms? Intuitively one would tend to reach a negative judgement, because 'cartelizing the national markets' does not sound exactly confidence inspiring. But semantics may not lead very far.

It follows from (8.13) that the range  $K - X_A^{z-1}$  which the  $z - 1$  first countries leave for the last country will be covered by that country's own production with the share  $m/(1 + m)$ . The share of this range not covered is therefore  $1/(1 + m)$ . Moreover it follows from (8.20) that the range, which the first  $z - 1$  countries leave for the last country, itself has a share of the competitive quantity  $K$  equal to  $1/2^{z-1}$ . Taking these pieces of information together shows that in the deregulation

race the gap between the competitive quantity and the actual production is

$$K - X = \frac{K}{2^{z-1}} \cdot \frac{1}{1+m}. \quad (\text{deregulation race}) \quad (8.23)$$

The cartelization of the market made possible by the deregulation race can be prevented either by harmonizing the antitrust regulation policies of all the individual countries or by creating a single antitrust authority which covers all the countries. Such measures would force the firms in all countries to behave in a Cournot-Nash manner, and, in accordance with (8.4), there would then be a gap between the competitive quantity and total production equal to

$$K - X = \frac{K}{z \cdot m + 1} \quad (\text{cartel ban covering all countries}) \quad (8.24)$$

where the number of firms  $n$  is replaced by the product of the number of countries and the number of firms per country.

It obviously follows from (8.23) and (8.24) that total sales with the deregulation race are larger than with the overall cartel ban, if

$$2^{z-1}(1+m) > 1+zm$$

or, which comes to the same thing, if

$$2^{z-1} - 1 > m(z - 2^{z-1}).$$

This inequality will obviously hold when there are at least two countries and at least two firms per country as was assumed. The following result is therefore obvious.

**Proposition 8.5:** *The deregulation race, which leads to a sequential repeal of the antitrust laws of the individual countries and which induces these countries to establish national conglomerates with credible supply decisions, results in higher total sales, lower prices, a higher consumer surplus and a lower aggregate profit than would be expected in the case of a cartel ban covering all countries.*

Surprisingly, an all-clear is appropriate for the allocation problem. Paradoxical and uncomfortable as it may sound, a deregulation race that results in the cartelization of the national markets and the formation of national conglomerates does not threaten to be at the expense of the consumers or to lower the welfare of all countries combined. On the contrary, at least in the symmetrical case of equally sized countries, the deregulation race has a very positive effect from an allocative point of view.

This does not mean that the race for the starting position does not create problems. One of the most serious of these is the very different distribution of profits which occurs in equilibrium. The disadvantaged industries will find it difficult to accept the unequal distribution and will attempt to achieve an equal distribution by means of centralized policy measures. The falling aggregate sum of profits will also lend support to such a policy measure.

One of the measures to achieve an equal profit distribution would be the establishment of an international antitrust board, preventing the single countries from taking on Stackelberg leadership positions. Another one would be an international agreement to build one big cartel covering all countries coupled with a sharing rule for the profits. However, all of this could not be legitimated from an international welfare perspective. If it happens, it will rather reflect the fact that the disadvantaged countries or companies have sufficient political power to enforce another allocation even though aggregate welfare declines.

## RECONSIDERATION OF REGULATION POLICY

When the European markets were fairly segmented, the goals of national competition policy were clear. The ordo liberal view that a workable competition with strict antitrust regulation would be the best precondition for national growth and prosperity was rightly shared among politicians and economists. Things have changed with the increasing international integration brought about by the forces of globalization in general and European integration in particular, which have strengthened the voices calling for a repeal of national antitrust laws and the creation of strong national conglomerates, strategic alliances and global players. While it is natural that these voices could always be heard from companies that attempted to increase their market powers, the new phenomenon is that politicians are joining the

choir and that more and more economists are advocating a generous interpretation or even a repeal of antitrust legislation when particular merger decisions are pending.

From a theoretical perspective, the case has not been decided. The defenders of *ordo liberal* positions argue that there is nothing to gain from the formation of global players and a lot to lose because the foundations of the competitive system are threatened. In the above model, this view could be defended with the case where no credible commitments to particular supply decisions could be made such that firms are forced to play Cournot-Nash games. Indeed, it was shown that a country that repeals its antitrust legislation is harming itself. It reduces the national share in aggregate company profits, hurts national consumers and, on balance, lowers national welfare. If this case prevails in reality, *ordo liberal* competition policies are likely to survive in systems competition, and Europe will develop as its founders had envisaged when they formulated the Treaty of Rome.

However, countries do try to exploit first-mover advantages by neglecting antitrust regulation and supporting the formation of national conglomerates or, which amounts to the same thing, keeping privatized state monopolies intact. It was shown that this policy is actually in the national interest if credible commitment strategies become available, because the national conglomerates are given the opportunity of taking on Stackelberg leadership positions. In such a situation, speed is important because there will be a race for such positions, and it is always better to mark out the claims earlier than later. An equilibrium where it is in the national interest of each country to stick to *ordo liberal* competition policies does not exist in this case. Instead, a hierarchy of national conglomerates emerges where the market share of domestic firms and national welfare are smaller the later the conglomerates are formed and where only the last country has no interest in deviating from *ordo liberal* policies.

Surprisingly, this kind of equilibrium turned out to be not as bad as expected. While welfare is distributed unevenly over the countries, aggregate output and welfare will even be higher than it would in an oligopoly situation where the national antitrust laws are maintained throughout. This is admittedly a somewhat disturbing result for a liberal economist, but if economics is a science, it is better that theoretical results shape policy rather than the other way around.

## Epilogue

This book deals with systems competition, i.e. competition of tax systems, of welfare and social standards, of infrastructure, of environmental, product and banking regulation and, finally, of competition laws. It shows that uncoordinated policy choices do not necessarily impair the economic development of nations. There are conditions under which the 'Invisible Hand' of systems competition works well. However, the book also identifies a number of problems, largely stemming from the Selection Principle – the fact that governments take charge of activities in which private markets have failed. I conclude that much more attention should be given to the definition of rules of conduct for competitive government behaviour. Well-functioning private markets emerged only after detailed rules for the exchange of goods and factors had been established. With regard to systems competition, such rules are still lacking. This book may contribute to a discussion on how and where such rules should be introduced and where, instead, a harmonization of government actions seems advisable. I hope it may also offer some useful suggestions on constructing the new Europe.

## References

### CHAPTER 1: COMPETITION AMONG STATES

- Altshuler, R., H. Grubert and T. S. Newlon (1998) 'Has U.S. Investment Abroad Become More Sensitive to Tax Rates?', *NBER Working Paper* No. 6383.
- Buchanan, J. M., and R. Musgrave (1999) *Public Finance and Public Choice: Two Contrasting Visions of the State*, CESifo Series, MIT Press: Cambridge, Mass.
- Buchanan, J. M., and G. Tullock (1962) *The Calculus of Consent: Logical Foundations of Constitutional Democracy*, University of Michigan Press: Ann Arbor.
- Dawkins, R. (1976) *The Selfish Gene*, Oxford University Press: Oxford.
- Demsetz, H. (1969) 'Information and Efficiency: Another Viewpoint', *Journal of Law and Economics* 12, 1–22.
- Dorfman, R., P. Samuelson and R. Solow (1958) *Linear Programming and Economic Analysis*, McGraw-Hill: New York.
- Edwards, J., and M. Keen (1996) 'Tax Competition and Leviathan', *European Economic Review* 40, 113–34.
- Glaser, E. L., and M. E. Kahn (1999) 'From Lindsay to Rudy Giuliani: The Decline of the Local Safety Net?' *Economic Policy Review* 5, 117–32.
- Hirschman, A. O. (1970) *Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations, and States*, Harvard University Press: Cambridge, Mass.
- International Organization for Migration (IOM) (1998) *Migration Potential in Central and Eastern Europe: A Survey of 11 Countries*, IOM: Geneva.
- Lindahl, E. (1939) *Studies in the Theory of Money and Capital*, George Allen & Unwin Ltd: London.

- Mennel, A., and J. Förster (1999) *Steuern in Europa, Amerika und Asien*, 38th edition, Verlag Neue Wirtschafts-Briefe: Herne/Berlin.
- Musgrave, R. A. (1959) *The Theory of Public Finance*, McGraw-Hill: New York.
- Nöhrbaß, K. H., and M. Raab (1990) 'Quellensteuer und Kapitalmarkt', *Finanzarchiv* 48, 179–93.
- Oates, W. E., and R. M. Schwab (1988) 'Economic Competition among Jurisdictions: Efficiency Enhancing or Distortion Inducing?', *Journal of Public Economics* 35, 333–54.
- OECD (1998) *Harmful Tax Competition. An Emerging Global Issue*, Organization for Economic Cooperation and Development: Paris.
- Olson, M. (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups*, Harvard Economic Studies 124, Harvard University Press: Cambridge, Mass.
- Richter, W. F. (1994) 'The Efficient Allocation of Local Public Factors in Tiebout's Tradition', *Regional Science and Urban Economics* 24, 323–40.
- Sax, E. (1887) *Grundlegung der theoretischen Staatswirtschaft*, Hölder: Vienna.
- Schäffle, A. E. (1880) *Die Grundsätze der Steuerpolitik und die schwebenden Finanzfragen Deutschlands und Österreichs*, Laupp: Tübingen.
- Schröder, Chr. (1999) 'Industrielle Arbeitskosten im internationalen Vergleich 1980/98', *iw-trends* 26, Köln, 35–49.
- Shefter, M. (1985) *Political Crisis, Fiscal Crisis – The Collapse and Revival of New York City*, Basic Books Publishers: New York.
- Sinn, H.-W. (1997a) 'The Selection Principle and Market Failure in Systems Competition', *Journal of Public Economics* 66, 247–74.
- (1997b) 'Das Selektionsprinzip und der Systemwettbewerb', in: A. Oberhauser, ed., *Fiskalföderalismus in Europa*, Duncker & Humblot: Berlin, 9–60.
- (2001) 'The New Systems Competition', *CESifo Working Paper* No. 623.
- Sinn, H.-W., G. Flaig, S. Munz and M. Werding (2001) *EU-Erweiterung und Arbeitskräftemigration: Wege zu einer schrittweisen Annäherung der Arbeitsmärkte*, Study for the German Federal Ministry for Labour and Social Affairs, Ifo Institute: Munich.
- Sinn, S. (1992) 'The Taming of the Leviathan: Competition among Governments', *Constitutional Political Economy* 3, 177–96.
- Timm, H. (1961) 'Das Gesetz der wachsenden Staatsausgaben', *Finanzarchiv* 21, 201–47.
- Wagner, A. (1876) *Allgemeine oder theoretische Volkswirtschaftslehre: Erster Theil. Grundlegung*, Winter'sche Buchhandlung: Leipzig and Heidelberg.
- Wellisch, D. (1995) *Dezentrale Finanzpolitik bei hoher Mobilität*, J.C.B. Mohr (Paul Siebeck): Tübingen.
- (1999) *Theory of Public Finance in a Federal State*, Cambridge University Press: Cambridge.

- Wicksell, K. (1901) *Lectures on Political Economy*, vol. 1, 1967, reprint of 1934 edition, Augustus M. Kelley: New York.
- Wilson, E. O. (1975) *Sociobiology: The New Synthesis*, Belknap Press of Harvard University Press: Cambridge, Mass.
- Wittman, D. A. (1995) *The Myth of Democratic Failure: Why Political Institutions are Efficient*, University of Chicago Press: Chicago and London.

## CHAPTER 2: TAXES AND PUBLIC INFRASTRUCTURE GOODS

- Bach, S., and B. Bartholmai (1998) 'Immobilienvermögen privater Haushalte in Deutschland 1995', *Wirtschaft und Statistik* 9/1998, 773–87.
- Berglas, D., and D. Pines (1981) 'Clubs, Local Public Goods and Transportation Models', *Journal of Public Economics* 15, 141–62.
- Bewley, T. F. (1981) 'A Critique of Tiebout's Theory of Local Public Expenditures', *Econometrica* 49, 713–40.
- Blankart, Ch. B. (1996) 'Braucht Europa mehr zentralstaatliche Koordination? Einige Bemerkungen zu Hans-Werner Sinn', *Wirtschaftsdienst* 76 (2), 87–91.
- Boadway, R. (1980) 'A Note on the Market Provision of Club Goods', *Journal of Public Economics* 13, 131–7.
- Borcherding, T. E., and R. T. Deacon (1972) 'The Demand for the Services of Non-Federal Governments', *American Economic Review* 62, 891–901.
- Brueckner, J. K. (1981) 'Congested Public Goods: The Case of Fire Protection', *Journal of Public Economics* 15, 45–58.
- Buchanan, J. M. (1965) 'An Economic Theory of Clubs', *Economica* 23, 1–14.
- Bucovetsky, S., and J. D. Wilson (1991) 'Tax Competition with Two Tax Instruments', *Regional Science and Urban Economics* 21, 333–50.
- Fuest, C. (1995) 'Interjurisdictional Competition and Public Expenditure: Is Tax Co-ordination Counterproductive?' *Finanzarchiv* 52, 478–96.
- Gerber, R. F., and D. P. Hewitt (1987) 'Decentralized Tax Competition for Business Capital and National Economic Efficiency', *Journal of Regional Science* 27, 451–60.
- Holcombe, R., and R. Sobel (1995) 'Empirical Evidence on the Publicness of State Legislative Activities', *Public Choice* 83, 47–58.
- Huizinga, H., and S. B. Nielsen (1997) 'Capital Income and Profit Taxation with Foreign Ownership of Firms', *Journal of International Economics* 42, 149–65.
- MacDougall, G. D. (1960) 'The Benefits and Costs of Private Investments from Abroad: A Theoretical Approach', *Economic Record* 36, 13–35.

- Meade Committee (1978) *The Structure and Reform of Direct Taxation*, Report of a Committee chaired by Professor J. E. Meade (The Institute for Fiscal Studies), Allen & Unwin: London, Boston and Sydney.
- Mohring, H., and M. Harwitz (1962) *Highway Benefits. An Analytical Framework*, Northwestern University Press: Chicago.
- Noiset, L. (1995) 'Pigou, Tiebout, Property Taxation and the Underprovision of Local Public Goods: Comment', *Journal of Urban Economics* 38 (3), 312–16.
- Oakland, W. H. (1972) 'Congestion, Public Goods and Welfare', *Journal of Public Economics* 1, 339–57.
- Oates, W. E. (1972) *Fiscal Federalism*, Harcourt Brace Jovanovich: New York.
- (1995) 'The Invisible Hand in the Public Sector: Interjurisdictional Competition in Theory and Practice', unpublished manuscript, presented at CES conference *Competition or Harmonization? – Fiscal Policy, Regulation, and Standards*, 30 October–2 November 1995, Tutzing.
- Oates, W. E., and R. M. Schwab (1988) 'Economic Competition among Jurisdictions: Efficiency Enhancing or Distortion Inducing?' *Journal of Public Economics* 35, 333–54.
- OECD (1977) *Model Double Taxation Convention on Income and on Capital*, Report of the OECD Committee on Fiscal Affairs, OECD: Paris.
- (1998) *Harmful Tax Competition. An Emerging Global Issue*, OECD: Paris.
- Pfähler, W. (1995) 'Infrastruktur und Regionalentwicklung aus mikroökonomischer Sicht – Eine kritische Bestandsaufnahme und Fallstudien', lecture prepared for Finanzwissenschaftlicher Ausschuss des Vereins für Socialpolitik, 25–27 May 1995, Vienna.
- Pines, D. (1991) 'Tiebout without Politics', *Regional Science and Urban Economics* 21, 69–89.
- Popitz, J. (1927) 'Der Finanzausgleich', in: W. Gerloff and F. Meisel, eds, *Handbuch der Finanzwissenschaft*, vol. II, J.C.B. Mohr (Paul Siebeck): Tübingen, 338–75.
- Razin, A., and E. Sadka (1991) 'Vanishing Tax on Capital Income in the Open Economy', *NBER Working Paper* No. 3796.
- Richman, P. B. (1963) *Taxation of Foreign Investment Income*, Johns Hopkins Press: Baltimore.
- Richter, W. F. (1994) 'The Efficient Allocation of Local Public Factors in Tiebout's Tradition', *Regional Science and Urban Economics* 24, 323–40.
- Richter, W. F., H. Seitz and W. Wiegand (1996) 'Steuern und unternehmensbezogene Staatsausgaben als Standortfaktoren', in: H. Siebert, ed., *Steuerpolitik und Standortqualität*, J.C.B. Mohr (Paul Siebeck): Tübingen.
- Sandler, T., and J. T. Tschirhart (1980) 'The Economic Theory of Clubs: An Evaluative Survey', *Journal of Economic Literature* 18, 1481–521.
- Sinn, G., and H.-W. Sinn (1991) *Kaltstart – Volkswirtschaftliche Aspekte der deutschen Vereinigung*, J.C.B. Mohr (Paul Siebeck): Tübingen. Cited

- according to the English edition: *Jumpstart*, MIT Press: Cambridge, Mass., 1992.
- Sinn, H.-W. (1985) *Kapitaleinkommensbesteuerung. Eine Analyse der intertemporalen, internationalen und intersektoralen Allokationswirkungen*, J.C.B. Mohr (Paul Siebeck): Tübingen. Cited according to the English edition: *Capital Income Taxation and Resource Allocation*, North Holland Publishing Company: Amsterdam, 1987.
- (1991a) 'The Vanishing Harberger Triangle', *Journal of Public Economics* 45, 271–300.
- (1991b) 'Taxation and the Cost of Capital: The "Old" View, the "New" View, and Another View', in: D. Bradford, ed., *Tax Policy and the Economy* 5, National Bureau of Economic Research, 25–54.
- (1993) 'Taxation and the Birth of Foreign Subsidiaries', in: H. Herberg and N. V. Long, eds, *Trade, Welfare, and Economic Policies, Essays in Honor of Murray C. Kemp*, Michigan University Press: Ann Arbor, 325–52.
- (1997) 'The Selection Principle and Market Failure in Systems Competition', *Journal of Public Economics* 66, 247–74.
- Walzer, N. (1972) 'Economics of Scale and Municipal Police Services: The Illinois Experience', *Review of Economics and Statistics* 54, 431–8.
- Weichenrieder, A. (1995) *Besteuerung und Direktinvestition*, J.C.B. Mohr (Paul Siebeck): Tübingen.
- Weichenrieder, A., and M. Reiter (1997) 'Are Public Goods Public? A Critical Survey of the Demand Estimates for Local Public Services', *Finanzarchiv* 54, 374–408.
- Wellisch, D. (1995) *Dezentrale Finanzpolitik bei hoher Mobilität*, J.C.B. Mohr (Paul Siebeck): Tübingen.
- Wildasin, D. E. (1986) *Urban Public Finance*, Harwood Academic Publishers: Chur, London, Paris and New York.
- Wilson, J. D. (1986) 'A Theory of Interregional Tax Competition', *Journal of Urban Economics* 19, 296–315.
- (1999) 'Theories of Tax Competition', *National Tax Journal* 52, 269–304.
- Zodrow, G., and P. Mieszkowski (1986) 'Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods', *Journal of Urban Economics* 19, 356–70.

### CHAPTER 3: THE EROSION OF THE WELFARE STATE

- Barr, N. (1992) 'Economic Theory and the Welfare State: A Survey and Interpretation', *Journal of Economic Literature* 30, 741–803.

- Buchanan, J. M., and G. Tullock (1962) *The Calculus of Consent*, University of Michigan Press: Ann Arbor.
- Bulow, J. I., and L. H. Summers (1984) 'The Taxation of Risky Assets', *Journal of Political Economy* 92, 20–39.
- Eisen, R. (1979) *Theorie des Versicherungsgleichgewichts*, Duncker und Humblot: Berlin.
- Friedman, M. (1953) 'Choice, Chance and the Personal Distribution of Income', *Journal of Political Economy* 61, 277–90.
- Gordon, R. H. (1985) 'Taxation of Corporate Capital Income: Tax Revenues versus Tax Distortions', *Quarterly Journal of Economics* 100, 1–27.
- Harsanyi, J. C. (1953) 'Cardinal Utility in Welfare Economics and the Theory of Risk Taking', *Journal of Political Economy* 61, 304–5.
- Kaplow, L. (1991) 'A Note on Taxation as Social Insurance for Uncertain Labor Income', *NBER Working Paper* No. 3708.
- Konrad, K. (1991) 'Risk Taking and Taxation in Complete Capital Markets', *The Geneva Papers on Risk and Insurance Theory* 16, 167–77.
- Musgrave, R. A. (1969) 'Theories of Fiscal Federalism', *Public Finance* 24, 521–36.
- Oates, W. E. (1972) *Fiscal Federalism*, Harcourt Brace Jovanovich: New York.
- Pauly, M. (1974) 'Overinsurance and Public Provision of Insurance. The Roles of Moral Hazard and Adverse Selection', *Quarterly Journal of Economics* 88, 309–27.
- Rawls, J. (1971) *A Theory of Justice*, Harvard University Press: Cambridge, Mass.
- Riley, J. G. (1979) 'Informational Equilibrium', *Econometrica* 47, 331–59.
- Rothschild, M., and J. Stiglitz (1976) 'Equilibrium in Competitive Insurance Markets. An Essay on the Economics of Imperfect Information', *Quarterly Journal of Economics* 90, 626–50.
- Scientific Council of the German Ministry of Finance (2001) *Freizügigkeit und soziale Sicherung in Europa*, Wissenschaftlicher Beirat beim BMFi, Berlin.
- Shavell, S. (1979) 'On Moral Hazard and Insurance', *Quarterly Journal of Economics* 93, 541–62.
- Sinn, H.-W. (1980) *Ökonomische Entscheidungen bei Ungewissheit*, J.C.B. Mohr (Paul Siebeck): Tübingen. English edition: *Economic Decisions under Uncertainty*, North Holland Publishing Company: New York, Amsterdam and Oxford, 1983. Reprint Physica Verlag: Heidelberg, 1989.
- (1990) 'Tax Harmonization and Tax Competition in Europe', *European Economic Review* 34, 489–504.
- (1995) 'A Theory of the Welfare State', *Scandinavian Journal of Economics* 97, 495–526.
- (1996) 'Social Insurance, Incentives and Risk Taking', *International Tax and Public Finance* 3, 1996, 259–80.
- Sinn, H.-W., G. Flaig, S. Munz and M. Werding (2001) *EU-Erweiterung und Arbeitskräftemigration: Wege zu einer schrittweisen Annäherung der*

- Arbeitsmärkte*, study for the German Federal Ministry for Labour and Social Affairs, Ifo Institute: Munich.
- Wildasin, D. (1991) 'Income Redistribution in a Common Labor Market', *American Economic Review* 81, 757–74.
- (1992) 'Relaxation of Barriers to Factor Mobility and Income Redistribution', in: P. Pesticaeu, ed., *Public Finance in a World of Transition, Proceedings of the 47th Congress of the International Institute of Public Finance, St. Petersburg 1991*, supplementary volume of *Public Finance* 47, 216–30.
- Wilson, Ch. (1979) 'Equilibrium and Adverse Selection', *American Economic Review* 69, Papers and Proceedings, 313–17.
- Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (1994) 'Ordnungspolitische Orientierung für die Europäische Union', *BMWi-Dokumentation*, No. 356.

## CHAPTER 4: SOCIAL DUMPING IN THE TRANSFORMATION PROCESS?

- Berié, H. (1993) 'Europäische Sozialpolitik. Von Messina bis Maastricht', in: G. Kleinhenz, ed., *Soziale Integration in Europa I*, Schriften des Vereins für Sozialpolitik NF 222/I, Duncker und Humblot: Berlin.
- Feldmann, H. (1999) 'Zehn Jahre EU-Sozialcharta', *Wirtschaftsdienst* 11, 670–6.
- Plant, R. (1994) *Labour Standards and Structural Adjustment*, International Labour Office: Geneva.
- Schröder, Chr. (2000) 'Industrielle Arbeitskosten im internationalen Vergleich', *iw-trends* 27 (3), 77–91.
- Sinn, G., and H.-W. Sinn (1991) *Kalstart. Volkswirtschaftliche Probleme der deutschen Vereinigung*, J.C.B. Mohr (Paul Siebeck): Tübingen 1991. English translation: *Jumpstart. Economic Aspects of German Unification*, MIT Press: Cambridge, Mass., 1992.
- Sinn, H.-W. (2000) 'EU Enlargement, Migration, and Lessons from German Unification', *German Economic Review* 1, 299–314.
- Sinn, H.-W., G. Flaig, S. Munz and M. Werding (2001) *EU-Erweiterung und Arbeitskräftemigration: Wege zu einer schrittweisen Annäherung der Arbeitsmärkte*, study for the German Federal Ministry for Labour and Social Affairs, Ifo Institute: Munich.

## CHAPTER 5: ECOLOGICAL COMPETITION

- Bovenberg, L., and R. van der Ploeg (1996) 'Optimal Taxation, Public Goods and Environmental Policy with Involuntary Unemployment', *Journal of Public Economics* 62, 59–83.

- Cumberland, J. H. (1979) 'Interregional Pollution Spillovers and Consistency of Environmental Policy', in: H. Siebert et al., eds, *Regional Environmental Policy: The Economic Issues*, New York University Press: New York, 255–81.
- Huizinga, H., and S. B. Nielsen (1997) 'Capital Income and Profit Taxation with Foreign Ownership of Firms', *Journal of International Economics* 42, 149–65.
- Long, N. V., and H. Siebert (1991) 'Institutional Competition Versus ex-ante Harmonization: The Case of Environmental Policy', *Journal of Institutional and Theoretical Economics* 147, 296–311.
- Oates, W. E., and R. M. Schwab (1988) 'Economic Competition among Jurisdictions: Efficiency Enhancing or Distortion Inducing?' *Journal of Public Economics* 35, 333–54.
- Sinn, H.-W. (1994) 'How much Europe? Subsidiarity, Centralization and Fiscal Competition', *Scottish Journal of Political Economy* 41, 85–107.
- United Nations (1997) *Framework Convention on Climate Change*, Third Session, Kyoto, 1–11 December 1997.

## CHAPTER 6: THE COMPETITION OF PRODUCT STANDARDS

- Akerlof, G. A. (1970) 'The Markets for Lemons: Quality, Uncertainty and the Market Mechanism', *Quarterly Journal of Economics* 84, 488–500.
- Allen, F. (1984) 'Reputation and Product Quality', *Rand Journal of Economics* 15, 311–27.
- Klein, B., and K. B. Leffler (1981) 'The Role of Market Forces in Assuring Contractual Performance', *Journal of Political Economy* 89, 615–41.
- Knieps, G. (1994) 'Standards und die Grenzen der unsichtbaren Hand', *Ordo* 45, 45–62.
- Shapiro, C. (1983) 'Premiums for High Quality Products as Returns to Reputations', *Quarterly Journal of Economics* 98, 659–79.
- Sinn, H.-W. (1997) 'The Selection Principle and Market Failure in Systems Competition', *Journal of Public Economics* 66, 247–74.

## CHAPTER 7: LIMITED LIABILITY, RISK-TAKING AND THE COMPETITION OF BANK REGULATORS

- Basel Committee on Banking Supervision (1988) *International Convergence of Capital Measurement and Capital Standards*, Bank for International Settlement, www.bis.org.
- (2001) *The New Basel Capital Accord – Consultative Document*, Bank for International Settlement, www.bis.org.

- Bester, H., and M. Hellwig (1987) 'Moral Hazard and Equilibrium Credit Rationing: An Overview of the Issues', in: G. Bamberg and K. Spremann, eds, *Agency Theory, Information and Incentives*, Springer: Berlin and Heidelberg.
- Blum, J., and M. Hellwig (1995) 'The Macroeconomic Implications of Capital Adequacy Requirements for Banks', *European Economic Review* 39, 739–49.
- Calomiris, C. W., and A. Powell (2000) 'Can Emerging Markets Bank Regulators Establish Credible Discipline? The Case of Argentina, 1992–1999', *NBER Working Paper* No. 7715.
- Corsetti, G., P. Pesenti and N. Roubini (1998) 'What Caused the Asian Currency and Financial Crisis? Part II: The Policy Debate', *NBER Working Paper* No. 6834.
- Dekle, R., and K. Kletzer (2001) 'Domestic Bank Regulation and Financial Crisis: Theory and Empirical Evidence from East Asia', *NBER Working Paper* No. 8322.
- Dornbusch, R. (1998) 'The New International Architecture', Munich Lectures in Economics, CES, University of Munich, unpublished manuscript.
- Dow, S. C. (1996) 'Why the Banking System Should be Regulated', *Economic Journal* 106, 698–707.
- Gollier, C., P.-F. Koehl and J.-C. Rochet (1997) 'Risk Taking Behavior with Limited Liability and Risk Aversion', *Journal of Risk and Insurance* 64, 347–70.
- Goodhart, C. A. E. (1991) 'Are Central Banks Necessary?' in: F. Capie and G. E. Wood, eds, *Unregulated Banking: Chaos or Order?*, Macmillan: London, 1–21.
- Jensen, M. C., and W. H. Meckling (1976) 'Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure', *Journal of Financial Economics* 3, 305–60.
- Kane, E. J. (2000) 'Capital Movements, Bank Insolvency, and Silent Runs in the Asia Financial Crisis', *NBER Working Paper* No. 7514.
- Kydland, F. E., and E. C. Prescott (1977) 'Rules Rather Than Discretion: The Inconsistency of Optimal Plans', *Journal of Political Economy* 85, 473–91.
- Miller, M. H. (1977) 'Debt and Taxes', *Journal of Finance* 32, 261–75.
- Minsky, H. (1991) 'The Financial Instability Hypothesis: A Clarification', in: M. Feldstein, ed., *The Risk of Economic Crisis*, University of Chicago Press: Chicago, 158–70.
- Modigliani, F. (1961) 'Long Run Implications of Alternative Fiscal Policies and the Burden of the National Debt', *Economic Journal* 71, 730–55.
- (1982) 'Debt, Dividend Policy, Taxes, Inflation and Market Valuation', *Journal of Finance* 37, 255–73.
- OECD (2001) *Bank Profitability: Financial Statements of Banks 2000*, OECD: Paris.

- Rochet, J. C. (1992) 'Capital Requirements and the Behaviour of Commercial Banks', *European Economic Review* 36, 1173–8.
- Sinn, H.-W. (1980) *Ökonomische Entscheidungen bei Ungewissheit*, Mohr: Tübingen. Cited according to the English translation: *Economic Decisions under Uncertainty*, North Holland Publishing Company: Amsterdam, New York and Oxford, 1983.
- (1982) 'Kinked Utility and the Demand for Human Wealth and Liability Insurance', *European Economic Review* 17, 149–62.
- (1986) 'Risiko als Produktionsfaktor', *Jahrbücher für Nationalökonomie und Statistik* 201, 557–71.
- Stiglitz, J., and Weiss, A. (1981) 'Credit Rationing in Markets with Incomplete Information', *American Economic Review* 71, 393–410.

## CHAPTER 8: THE COMPETITION OF COMPETITION RULES

- Berle, A. A., and G. C. Means (1932) *The Modern Corporation and Private Property*, Macmillan: New York.
- Brander, S. A., and B. J. Spencer (1981) 'Tariffs and the Extraction of Foreign Monopoly Rents under Potential Entry', *Canadian Journal of Economics* 14, 371–89.
- Eucken, W. (1952) *Grundsätze der Wirtschaftspolitik*, Bern: Francke.
- Kreps, D. M., and J. A. Scheinkman (1983) 'Quantity Precommitment and Bertrand Competition Yield Cournot Outcomes', *Bell Journal of Economics* 14, 326–37.
- Olson, M. (1965) *The Logic of Collective Action*, Harvard University Press: Cambridge, Mass.

## Index of Names

Akerlof, G. A. 136ff  
 Allen, F. 138  
 Altshuler, R. 19  
  
 Bach, S. 59  
 Barr, N. 68  
 Bartholmai, B. 59  
 Berglas, D. 31, 39  
 Berié, H. 87  
 Berle, A. A. 179  
 Bester, H. 156  
 Bewley, T. F. 31  
 Bismarck, O. von 7  
 Blankart, Ch. B. 41  
 Blum, J. 151  
 Boadway, R. 31, 32, 39  
 Borcharding, T. E. 41  
 Bovenberg, L. 129  
 Brander, S. A. 192  
 Brueckner, J. K. 41  
 Buchanan, J. M. 8, 39, 66  
 Bucovetsky, S. 52  
 Bulow, J. I. 68  
  
 Calomiris, C. W. 151  
 Corsetti, G. 151  
 Cumberland, J. H. 112

Dawkins, R. 12  
 Deacon, R. T. 41  
 Dekle, R. 151  
 Demsetz, H. 15  
 Dorfman, R. 17  
 Dornbusch, R. 151  
 Dow, S. C. 156  
  
 Edwards, J. 8  
 Eisen, R. 68  
 Eucken, W. 179  
  
 Feldmann, H. 87  
 Förster, J. 20  
 Flaig, G. 24, 80, 106  
 Friedman, M. 66  
 Fuest, C. 45  
  
 Gerber, R. F. 31  
 Glaeser, E. L. 4  
 Gollier, C. 156  
 Goodhart, C. A. E. 156  
 Gordon, R. H. 68  
 Grubert, H. 19  
  
 Harsanyi, J. C. 66  
 Harwitz, M. 32, 38

Hayek, F. A. 5  
 Hellwig, M. 151, 156  
 Hewitt, D. P. 31  
 Hirschman, A. O. 2  
 Holcombe, R. 41  
 Huizinga, H. 55, 122

Jensen, M. C. 156, 170

Kahn, M. E. 4  
 Kaplow, L. 68  
 Kane, E. J. 151  
 Keen, M. 8  
 Klein, B. 138  
 Kletzer, K. 151  
 Knieps, G. 136  
 Koehl, P.-F. 156  
 Konrad, K. 68  
 Kreps, D. M. 181  
 Kydland, F. E. 156

Leffler, K. B. 138  
 Lindahl, E. 7  
 Lindsay, J. 4  
 Long, N. V. 112, 117

MacDougall, G. D. 28, 51  
 Means, G. C. 179  
 Meckling, W. H. 156, 170  
 Mennel, A. 20  
 Mieszkowski, P. 31, 49, 51,  
 61  
 Miller, M. H. 165  
 Minsky, H. 156  
 Modigliani, F. 165  
 Moring, H. 32, 38  
 Munz, S. 24, 80, 106  
 Musgrave, R. A. 7ff, 77

Newlon, S. T. 19  
 Nielsen, S. B. 55, 122  
 Nöhrbaß, K. H. 18  
 Noiset, L. 61

## Index of Names

219

Oakland, W. H. 32  
 Oates, W. E. 6, 30, 50, 77, 113,  
 122  
 Olson, M. 8, 189

Pauly, M. 68  
 Pesenti, P. 151  
 Pfähler, W. 32  
 Pines, D. 31, 39  
 Plant, R. 87  
 Ploeg, R. van der 129  
 Popitz, J. 61  
 Powell, A. 151  
 Prescott, E. C. 156

Raab, M. 11  
 Rawls, J. 66  
 Razin, A. 29, 86  
 Reiter, M. 41  
 Richter, W. F. 6  
 Richman, P. B. 28, 51  
 Richter, W. F. 31  
 Riley, J. G. 72  
 Rochet, J. C. 156  
 Rothschild, M. 68  
 Roubini, N. 151

Sadka, E. 29  
 Samuelson, P. 17  
 Sandler, T. 31  
 Sax, E. 7  
 Schäffle, A. E. 7  
 Scheinkmann, J. A. 181  
 Schröder, C. 22, 89  
 Schumpeter, J. A. 5  
 Schwab, R. M. 6, 30, 113,  
 122  
 Seitz, H. 31  
 Shapiro, C. 138  
 Shavell, S. 74  
 Shefter, M. 4  
 Siebert, H. 112, 117  
 Sinn, G. 59, 93, 110

- Sinn, H.-W. 1, 6, 24, 52ff, 56, 59,  
61, 69, 73ff, 80, 83, 87, 93,  
106, 110, 122, 139, 151, 156,  
158, 160, 165, 167
- Sinn, S. 6
- Smith, A. 5
- Sobel, R. 41
- Solow, R. 17
- Spencer, B. J. 192
- Stiglitz, J. 68, 156
- Summers, L. H. 68
- Timm, H. 7
- Tschirhart, J. T. 31
- Tullock, G. 8, 66
- Wagner, A. 7
- Walzer, N. 41
- Weichenrieder, A. 41
- Weiss, A. 156
- Wellisch, D. 6, 30
- Werding, M. 24, 80, 106
- Wicksell, K. 7
- Wiegard, W. 31
- Wildasin, D. E. 31, 77
- Wilson, Ch. 68
- Wilson, E. O. 12
- Wilson, J. D. 31, 49, 50, 52
- Wittmann, D. A. 15
- Zodrow, G. 31, 49, 51, 61

## Subject Index

Note: 'n.' after a page reference indicates the number of a note on that page.

- adverse selection
  - lemons problem 137-8
  - welfare state 68
  - model 72, 74
  - wage insurance, non-existent market for 81
- Akerlof's lemons model 136, 137
- antitrust authorities 179-80
- common market, advantage of 185
- deregulation race 194-6, 199-205
- ordo liberal equilibrium 186, 187
- ordo liberal policy vs. first-mover advantages 188, 189, 192-4
- regulation policy reconsidered 205-6
- Asian banking crisis 150-1, 154, 168
- asylum seekers and refugees 3, 22-3, 24
- Austria, taxation of interest income 18-19, 27
- average cost pricing 48-9, 60
- banking regulation
  - banking risks 150-2
  - Basel Committee and EU 174-7
  - basic model 157-9
  - competition 168-74
  - lemon banking and BLOOS rule 159-65
  - lemon bonds 152-5
  - limited liability and risk-taking, literature 155-7
  - welfare implications and optimal regulation 165-8
- Basel Accords 152, 175-7
- Bavarian Hypo 178
- Bavarian Vereinsbank 178
- Belgium
  - corporate tax 20
  - product standards 135
- BLOOS rule 151, 152, 156, 159-65
- competition of banking regulation 170-3
- unlimited liability model 158
- welfare implications 167-8

- bonds, lemon 152-5, 159-65, 175
  - Basel II 176
  - welfare implications 166
- BSE 137, 138, 148
- business economics 11, 12, 13
- Canada, banking regulation 177 n.16
- capital market integration 16-21
- capital mobility 2-3
  - euro 16-21
  - taxes 28-30, 50
- cartels 79
  - deregulation race 195-200, 202-5
  - monopoly regulation 180-1, 183-4
  - ordo liberal policy vs. first-mover advantages 189, 190-2, 193-4
- cash flow taxes 53-4
- Cassis de Dijon 135-6, 147
- China, market economy 1
- clubs, theory of 31, 39-41
- common market, advantage of 184-6
- communism 1, 2
- competition rules 178-80
  - common market 184-6
  - deregulation race 194-205
  - monopoly regulation 180-4
  - ordo liberal equilibrium 186-7
  - ordo liberal policy vs. first-mover advantages 188-94
  - regulation policy reconsidered 205-6
- competitive processes, hierarchy of 10-13
- corporate taxes 19-20, 27
- Cyprus, EU accession 24
- Czech Republic
  - ecological dumping 118
  - EU accession 24
  - migration flows 22-3
- debt-GDP ratios 18
- delayed integration principle 80-1
- deposit insurance 157
- Deutsche Post 179, 189
- dividend taxes 53-6
- ecological competition
  - conditions for 113-17
  - ecological dumping vs. excessively green policies 112-13
  - ecological dumping with international spillovers 117-21
  - environmental policy externalities 130-3
  - environmental standards 128-30
  - inefficient governments 9
  - policy implications 133-4
  - pollution certificates, foreign direct investment and rent dissipation effect 121-7
- economic theory 11, 12, 13
- Electricité de France 179, 189
- environmental issues *see* ecological competition
- environmental standards 122, 127-30, 131, 132
  - policy implications 133
- equity traps 53-6
- Estonia, EU accession 24
- Euler's Theorem 38
- euro 16-21
- European Union (EU)
  - banking regulation 176-7
  - competition rules 178, 180, 206
  - eastern expansion
    - 'four basic freedoms' 14
    - migration flows 3, 24-5, 79
    - social dumping 87, 109
  - euro and capital market integration 16-21
  - future 25-6
  - home country principle 80
  - inclusion principle 79

- migration flows 3, 21-5
- product standards
  - laxity, competition of 146
  - lemons problem 139
  - origin principle 135-6
  - policy implications 147-8
- Rome, Treaty of (1957) 14, 81, 92, 206
- Social Charter 86-7, 111
- social dumping 110-11
  - German unification, lessons from 109, 110
  - overall welfare optimum 101
  - properties of catching-up process 102
  - Social Charter 86-7, 111
  - wage costs 89-92
- systems competition as
  - construction principle for 14-16
- taxes and public infrastructure
  - goods 42, 60-1
  - dividend taxes 56
  - existence problems 58
  - residence taxes 52, 53
  - self-financing constraints and average cost pricing 48-9, 60
- welfare state 78, 79, 80, 81
  - end of 75
- see also named countries*
- evolution 12-13
- exchange rate volatility 16, 18
- Exxon Corp. 178
- family economics 11, 12
- Finland, interest rates 18
- first-mover advantages 179, 206
  - ordo liberal policy vs. 188-94
- fiscal systems *see* taxes
- foreign direct investment
  - banking regulation 154-5, 169-70, 173-4, 175
- ecological competition 122-30
  - environmental policy spillovers 131, 132
  - policy implications 133-4
  - product standards 147
- France
  - Agency for the Sanitary Safety of Health Products 139
  - banking regulation 154
  - corporate tax 19, 20
  - ecological dumping 117, 118
  - Electricité de France 179, 189
  - labour taxes 21
  - market economy 1
  - product standards 135, 139
- free trade zones 27
- Germany
  - banking regulation 154, 173
  - Deutsche Post 179, 189
  - DIN norms 138, 144
  - ecological competition 117, 121, 128
  - Federal Institute for Drugs and Medical Devices 139
  - foreign direct investment in 147
    - banking 154, 173
  - industrial location 26
  - interest rates 16
  - Landesbanken 189
  - Location Preservation Law (1994) 20
  - market economy 1
  - migration flows 3, 22-3, 58-9
  - product standards 135
    - DIN norms 138, 144
    - Federal Institute for Drugs and Medical Devices 139
  - reaction to policy moves of other countries 4
  - social dumping 88, 109-10, 111
  - taxes 18, 21, 55, 56
    - corporate 19, 20, 27

- Germany (*cont'd*)  
 unification  
   migration flows 59  
   social dumping 109–10, 111  
   welfare state 67  
 wages 22, 24  
 welfare state  
   immigrants 80–1  
   old-age pension 66–7  
   Solidarity Compact 67  
 globalization  
   banking regulation 154, 175  
   competition rules 179, 188, 205  
   ecological competition 132  
   welfare state 64–5, 78  
 global warming 118  
 Greece, social dumping 91  
 guest workers *see* migration flows  
  
 highway congestion models 32  
 home country principle 79–80  
 Hungary, EU accession 24  
  
 ILO (International Labour Organization) 86, 87, 111  
 IMF (International Monetary Fund) 152  
 impure public goods 32–6  
 inclusion principle 79  
 Indonesia, banking crisis 150  
 inefficiency, government 8–9  
 inflation, and euro 16–17  
 infrastructure goods 30–1  
   clubs, theory of 39–41  
   existence problems 56–60  
   financing 38–9  
   impure public goods 32–6  
   income redistribution 66  
   overprovision 43–6  
   policy implications 60–1  
   Selection Principle 31, 37, 39–43, 49, 58–60  
   self-financing constraints and average cost pricing 45–9  
   social optimum 36–7  
 institutions, Hirschman's theory of 2  
 insurance  
   private 67–8, 69–70  
   banking sector 165  
   end of welfare state 74, 77–8  
   model 71–4  
   wage insurance market, non-existence 81–5  
   public *see* welfare state  
 interest income, taxation of 18–19, 27  
 interest rates, and euro 16–18  
 International Labour Organization (ILO) 86, 87, 111  
 International Monetary Fund (IMF) 152  
 International Organization for Migration (IOM) 24  
 Internet 2  
 Invisible Hand 5, 6  
   social dumping and 108  
   tax competition 37  
 IOM (International Organization for Migration) 24  
 Ireland, Republic of  
   corporate tax 20, 27  
   social dumping 91  
   wages 22  
 Italy  
   banking regulation 154 n.5  
   corporate tax 19, 20  
   interest rates 16  
   labour taxes 21  
   product standards 135  
   refugees 3  
  
 Japan  
   banking regulation 154, 177 n.16

- Centre for the Evaluation of Pharmaceuticals and Medical Devices 139  
 labour taxes 21  
 market economy 1  
 mergers 178  
  
 Korea, banking crisis 150, 151  
 Kyoto conference (1997) 134  
  
 labelling, product 137  
 labour migration *see* migration flows  
 labour taxes 20–1, 42  
 land, returns to 59  
 language issues 3  
 Latvia, EU accession 24  
 lemon bonds 152–5, 159–65, 175  
   Basel II 176  
   welfare implications 166  
 lemons problem, product standards 136–9  
   allocative explanation of state regulation 141–4  
   laxity, competition of 146  
   policy implications 147–8  
   simple model 139–41  
 limited liability, banks 151, 155–7, 159–65  
 Lithuania, EU accession 24  
 lobbying activities 9  
   banking sector 168  
 Luxembourg, taxes 27  
  
 Maastricht Treaty 18  
   Subsidiarity Principle 14, 16  
 Malaysia, banking crisis 150, 151  
 Malta, EU accession 24  
 Meade Committee (1978) 53ff  
 Mercedes 27  
 mergers and acquisitions 178, 179  
   cross-border 2  
   monopoly regulation 180–1  
   ordo liberal equilibrium 186–7  
   regulation policy reconsidered 205  
 Mexico, banking crisis 150, 151  
 migration flows  
   Europe 3, 21–5  
   refugees and asylum seekers 3, 22–3, 24  
   social dumping 111  
   model of catching-up process 93–5  
   national government policy 97–8  
   properties of catching-up process 103–4, 107–8  
   wage costs 92  
   taxes 53, 58–9  
   welfare state 75–6, 78–81  
 Mobil Corp. 178  
 Model Double Taxation Convention, OECD 52  
 Modigliani-Miller theorem 165  
 monopoly regulation 180–4  
 Moody's 154  
 moral hazard effects  
   lemons problem 138  
   welfare state 74  
 multinational companies 2  
   labour migration 3  
  
 Netherlands, the  
   banking regulation 154 n.5  
   corporate tax 20  
   ecological competition 118  
   industrial location 26  
   Wassenaar agreement on wage moderation 4  
 New York City, social assistance programme 4, 78–9  
 Norway, ecological competition 117  
  
 OECD *see* Organization for Economic Cooperation and Development

- old-age pensions, Germany 66–7
- old systems competition 1, 2
- ordo liberalism 179–80
  - common market, advantage of 185
- deregulation race 200, 203
- equilibrium 186–7
- first-mover advantages vs. 188–94
- monopoly regulation 180–4
- regulation policy reconsidered 205–6
- Organization for Economic Cooperation and Development (OECD) 43, 155
- international capital, increased mobility 2–3
- labour taxes 20, 21
- Model Double Taxation Convention 52
- origin principle 135–6, 145
- pensions, old-age (Germany) 66–7
- People's Republic of China, market economy 1
- Perry Lux Agency 61
- Philippines, the, banking crisis 150
- Poland, EU accession 24
- pollution *see* ecological competition
- pollution certificates 121–9, 131, 132
- policy implications 133–4
- Portugal
  - migration flows 24–5
  - social dumping 88, 91
- principal agent model 11
- privatized state firms 178–9, 188–9, 206
- product standards
  - allocative explanation of state regulation 141–4, 148–9
  - Cassis de Dijon 135–6
  - laxity, competition of 144–6
  - lemons problem 136–9
  - policy implications 147–8
  - simple model 139–41
- public choice school 10–12, 13
  - inefficient governments 8, 9
- public finance, traditional school 7, 11, 12
- quality *see* product standards
- refugees and asylum seekers 3, 22–3, 24
- residence taxes 51–3
- retained earnings, taxation 52, 54–5
- Rome, Treaty of (1957) 14, 81, 92, 206
- Sanyo 178
- Savings & Loan crisis 150, 154
- SBC CableComms 178
- Scandinavia
  - banking regulation 154 n.5
  - market economy 1
  - see also named countries*
- Schengen Agreement 14
- Schweizerische Bankgesellschaft 178
- Schweizerischer Bankverein 178
- Scientific Council of the German Ministry of Finance 80
- Selection Principle 5–8
  - banking regulation 169, 175
  - ecological competition 131
  - inefficient governments 9
  - product standards 135, 146
  - taxes and public infrastructure goods 31, 37, 39–43
  - average cost pricing 49
  - existence problems 58–60
  - welfare state 66–70
  - end of 77–8
  - model 71
- self-financing constraints 46–9, 50, 60
- share issues 56
- Singapore, banking crisis 150, 151
- Slovakia, EU accession 24
- Slovenia, EU accession 24
- Social Charter, EU 86–7, 111

- social dumping
  - accusation 86–7, 110–11
  - direct and indirect wage costs, differences in 89–93
  - German unification, lessons from 109–10
  - model of catching-up process 93–7
  - national government policy 97–9
  - overall welfare optimum 100–2
  - properties of catching-up process 102–8
  - redistribution vs. wages in kind 88–9
- social security *see* welfare state
- sociobiology 12–13
- South Korea, banking crisis 150, 151
- Spain
  - banking regulation 154 n.5
  - interest rates 16, 18, 91
  - migration flows 24–5
  - social dumping 88
- Spanish Telefonica 179, 189
- Stackelberg leadership position 190–4
  - deregulation race 194, 201–2, 203, 205
  - regulation policy reconsidered 206
- Standard & Poor 154
- standards *see* environmental standards; product standards
- stock markets 165
- strategic alliances 178, 179, 188
  - deregulation race 195
  - regulation policy reconsidered 205
- Subsidiarity Principle, Maastricht Treaty 14, 16
- subsidies, prohibition of 46, 49
- Sweden
  - industrial location 26
  - interest income, taxation of 18–19, 27
  - social dumping 88
- Switzerland
  - banking regulation 154, 177 n.16
  - home country principle 80
  - United Bank of Switzerland 178
  - systems economics 9, 10–13
- Taiwan, banking crisis 150, 151
- taxes 27–30
  - clubs, theory of 39–41
  - dividend 53–6
  - ecological competition
    - conditions for 113, 114–16
  - ecological dumping with international spillovers 120–1
  - environmental policy externalities 131–2
  - policy implications 133, 134
  - pollution certificates 121–2
- equity traps 53–6
- euro 18–21
- evasion 52
- existence problems 56–60
- harmonization 43–6
- impure public goods 32–6
- infrastructure goods 30–1, 38–9
- optimum benefit tax rate 34–6
- policy implications 60–1
- residence 51–3
- Selection Principle 31, 37, 39–43, 49, 58–60
- self-financing constraints and average cost pricing 45–9
- social optimum 36–7
- welfare state
  - end of 74–8
  - model 73
  - policy implications 79–80
- TeleWest Communications plc 178
- Thailand, banking crisis 150, 151
- Toshiba 178
- traditional school of public finance 7, 11, 12

- Turkey
  - EU accession 24
  - labour taxes 21
- undercapitalization of banks
  - 151
- unemployment, and German unification 109
- United Bank of Switzerland (UBS)
  - 178
- United Kingdom
  - banking regulation 154
  - corporate tax 19
  - ecological dumping 117
  - labour taxes 21
  - Medicines Control Agency 139
  - mergers 178
- United Nations 134
- United States of America
  - banking regulation 154, 177 n.16
  - ecological competition 121, 134
  - Food and Drug Administration
    - 138-9, 144, 148
  - home country principle 80
  - labour taxes 21
  - market economy 1
  - Mercedes 27
  - migration flows 23, 59
  - Mobil and Exxon merger 178
  - New York social assistance
    - programme 4, 78-9
  - Savings & Loan crisis 150, 154
  - tax cut cum base broadening
    - policy (1986) 4, 19-20
- usage cost function 32, 33, 34
- virtual firms 2
- wages
  - differences
    - labour migration 22, 24-5
    - social dumping 89-93
  - direct and indirect costs 89-93
  - insurance market, non-existence
    - 81-5
  - in kind 88-9
  - social dumping 110-11
    - German unification, lessons
      - from 109, 110
    - model of catching-up process
      - 94-5
    - national government policy 98-9
    - properties of catching-up
      - process 103, 106-8
- Welfare Economics, Main Theory of
  - 5, 8-9
- welfare implications
  - banking regulation 165-8
  - competition 169-73
  - competition rules
    - common market, advantage of
      - 186
    - deregulation race 199-200,
      - 204-5
    - monopoly regulation 183-4
    - ordo liberal equilibrium 187
    - ordo liberal policy vs. first-mover advantages 189, 192-4
    - regulation policy reconsidered
      - 206
  - welfare state
    - end of 74-8
    - globalization 64-5
    - model 70-4
    - policy implications 78-81
    - Selection Principle 66-70
    - social dumping 86, 88, 89
    - wage insurance market, non-existence 81-5
- Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft 80
- World Bank 152
- Zodrow-Mieszkowski infrastructure
  - model 31, 49-51, 61-3